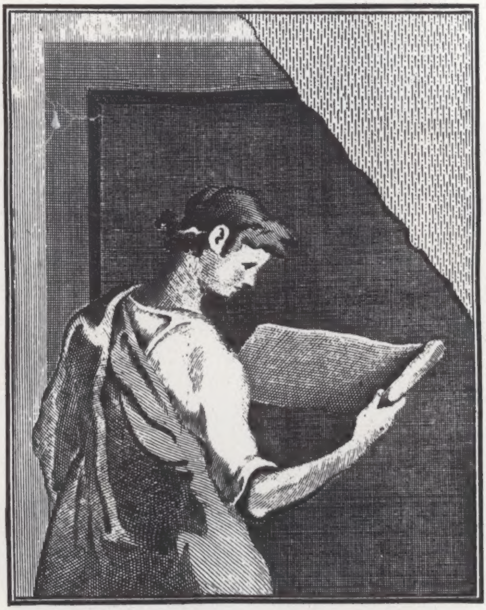

ILLUSTRATED

Annual Register

OF

RURAL AFFAIRS,

FOR

1876-7-8.

WITH 441 ENGRAVINGS.

VOL. VIII.

ALBANY, N. Y.:

LUTHER TUCKER & SON.

1878.

RURAL AFFAIRS:

A PRACTICAL AND COPIOUSLY

ILLUSTRATED REGISTER

OF

RURAL ECONOMY AND RURAL TASTE,

INCLUDING

COUNTRY DWELLINGS, IMPROVING AND PLANTING GROUNDS,
FRUITS AND FLOWERS, DOMESTIC ANIMALS,

AND ALL

FARM AND GARDEN PROCESSES.

By J. J. THOMAS,

AUTHOR OF THE "AMERICAN FRUIT CULTURIST," AND "FARM IMPLEMENTS,"
ASSOCIATE EDITOR OF THE "CULTIVATOR & COUNTRY GENTLEMAN."

VOL. VIII.
FOUR HUNDRED AND FORTY-ONE ENGRAVINGS.

ALBANY, N. Y.
LUTHER TUCKER & SON, 395 BROADWAY.
1878.

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THE

ILLUSTRATED ANNUAL REGISTER

OF

RURAL AFFAIRS.

CONSTRUCTION OF ICE-HOUSES.

THERE IS NO REASON why every family living near a freezing sheet of water should not enjoy the cooling luxury of ice all through summer. It will keep as well in the house of cheap construction as in the most expensive one, from the simplest structure of logs or slabs, costing ten dollars, to the ornamental erection at an expense of five hundred or more. Where the ice may be obtained within a mile or two, enough may be cut, and drawn with a wagon or sled in two or three days during the leisure time of winter, and be securely packed away, to afford a family several pounds every day from June to October.

It was once a common opinion that there was not only some special secret or skill required to keep ice, but the buildings made for this purpose were needlessly costly; and many persons lost all their ice before mid-summer, in spite of all labor and precaution. They did not understand

the simple requisites for success; they worked hard to secure the very causes of failure. One of the commonest mistakes was, after encasing the ice in a proper non-conductor, to shut the apartment close, without any ventilation. Another arose from the supposed necessity of placing it underground, where drainage was difficult. A third was, after building thick non-conducting walls, to pack the ice within them with crevices all around it, through which currents of air could readily pass.

There are three main and essential requisites for success in keeping ice, viz.: 1. A closely packed non-conducting substance, such as sawdust, chaff, chopped straw, swamp moss, or dry tan, on the six sides of the enclosed cubic mass of ice. 2. Perfect drainage at the bottom, without the admission of air. 3. A free circulation of air over the top of the upper packing or covering.

In order to explain more clearly the application of these essentials, it will be best to describe first some of the simplest and cheapest ice-houses, and the modes for filling them.

Cheap Ice-Houses.

In newly settled and timbered countries, the new resident who has small means may at once provide himself with a building of logs which will answer a good purpose. The floor may be of slabs, and the roof may be a thin covering of brush to hold the packing—fig. 2. If sawdust is used,

Fig. 2.—*Ice-house of Logs.*

the crevices between the logs will need close stopping. If straw is employed, little care of this kind will be necessary. In either case, however, special attention will be needed that the projecting sides of the logs inside do not prevent the proper settling and close packing of these materials around the ice On this account it is better to line the inside with boards placed upright, down the inner faces of which the packing may be readily pressed. Slabs, with the sawed faces inward, may be used for this purpose.

It may be well to state here that while double walls, filled in with a packing of the non-conducting substance, are often useful, they are by no means essential to success. We have never known ice to keep better than in a rough shanty with single inch-board walls. But it is, of course, all-essential that

there be a good and perfect packing all around between these walls and the enclosed cubic mass of ice. If sawdust is used, ten inches, or a foot at most, will be thick enough, if well and evenly packed, so that there may not be the smallest crevices or cavities. If fine, soft straw is employed, the thickness should be nearly twice as great. Oat straw, being soft and pliable, will answer well, although it is better if passed through a straw-cutter; but more rigid kinds of straw will need cutting quite short. Fine clean chaff answers a good purpose. Dry swamp moss is excellent.

The best soil on which to set an ice-house is one that is dry and gravelly and has a natural drainage below. This will not only carry off all the water from the melting of the ice, but the sills, floor and posts will last longer than where the ground is liable to be water-soaked. If there is not a good natural drainage, ditches should be cut, and if the posts, where these are employed, are set in the broken stones or gravel of these drains, they will last many years, for the water which may come in contact with them will quickly pass off without soaking into the wood.

The easiest way to effect proper drainage to the ice, is to lay a loose board, plank or slab floor, on supports or sleepers, when all the water which drops through from the melting ice can flow off freely. On this floor place ten inches of sawdust, or a corresponding quantity of other packing. It should be spread very evenly, so that the ice may rest square upon it; and it should be a very little higher towards the outside than nearer the centre, in order that the blocks of ice may not settle apart. The weight of the mass upon the sawdust at the floor presses it firmly together, and prevents the admission of air, while it is sufficiently porous to allow all the water to drain off from the melting ice. In more elaborate houses, with but little packing under the ice, a close floor of plank is sometimes laid, with a slight depression or trough across the middle for collecting the drainage, which is carried off through a pipe; and to prevent the ingress of warm air through this pipe, which would tend to melt the ice, a *trap* is provided which will allow the water to flow out, but prevents the

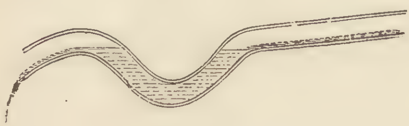
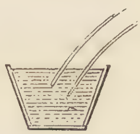


Fig. 3.—*Trap for excluding air, made by bending the tube.*



g. 4.—*Trap made by inserting the tube in a basin.*

air from passing in. The simplest mode for constructing such a trap is to make a curvature in the lead tube downward and up again, as in fig. 3, thus filling the curve with water, which excludes air; or the same end may be accomplished by inserting the end of the tube in a basin, as shown in fig. 4.

In all cases where it is practicable, the ice should be cut by sawing out in square blocks of uniform size, by first measuring and scratching lines on the surface for the saw to follow. The most convenient size for handling and drawing on sleds and wagons is 2 feet square and 8 to 10 inches thick, and these cakes or blocks will weigh about 150 to 200 pounds each. If the ice is thinner than 6 inches, it will not bear the team, and the cakes must be moved ashore by hand; and if more than a foot thick, they are not quite so readily handled in drawing and packing.

In constructing an ice-house, therefore, the interior should be of such size that two feet blocks will pack in a solid mass in the middle, and leave at least 10 inches of sawdust on each side, where the walls are single, for encasing the ice in this non-conductor; or leaving a space of 15 or 20 inches on each side if straw is to be used. For example, suppose that it is desired to place in the building a solid mass 8 feet square, or four 2-feet blocks of ice each way, or sixteen blocks for each tier or layer, as shown in fig. 5. Then the inside of the building should be 8 feet and twice 10 inches each way, or 9 feet and 8 inches, if for sawdust packing; or 8 feet and twice 20 inches, or 11 feet 4 inches, if for straw filling. (If there are double walls, a different measurement must be made, as we shall explain hereafter.) If the ice-house is already built, the cakes of ice must be cut of such a size as will leave a proper space for filling.

Fig. 5.

When the time arrives for cutting and filling in the ice, a proper amount of the packing must be first procured. Then, as the ice is drawn and deposited on the floor prepared with its 8 or 10 inches of packing, as described on the preceding page, the spaces around the mass are to be carefully and compactly filled in, so as to leave no cavities. When completed, the ice is to be covered with a foot of sawdust or its equivalent of other material, and a free circulation of air provided for over the top of this covering. This free ventilation is absolutely necessary. The neglect of it, and the close shutting of ice-houses, were the chief causes of failure in former years. An experiment under our observation many years since, presented a striking proof. We had filled an ice-house and had its contents well packed in sawdust, and were afterwards unable to give it personal attention. After several days of warm weather the hired man came to us one sultry day and with much alarm informed us that the ice was melting rapidly, and that it had already sunk nearly a foot from this cause. On inquiry if all the windows or doors were shut, "Yes, sir," said he, "everything is as tight as a barrel." He was puzzled and alarmed when we directed him to "throw open the upper doors or windows, and let the air sweep through." "Why, sir, it will melt all the ice!" "Never mind, throw them open and fasten

them; and then make a mark at the top of the ice, and tell me how much it sinks for the next week." The order was attended to, and at the end of the week the inquiry was made how much the ice had fallen by melting. "Not a quarter of an inch," was the answer, and we had no farther trouble with its melting.

For the simplest and cheapest ice-house built of logs, and which we have represented by fig, 2, the only covering on the sawdust, to keep the wind from blowing it away is a stratum of loose brush, through which the air can circulate. The foot of sawdust absorbs any rain that may fall upon it, and the air and warmth evaporate it again, although a roof to carry it off might possibly be an improvement.

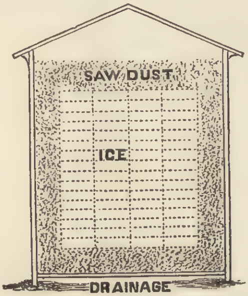


Fig. 6.—*Vertical Section of Single Wall.*

Trees are recommended for planting on the south side, to protect the building from the sun. These trees will afford a pleasant and agreeable shade, but they are by no means essential to the keeping of the ice, as the sun's rays will scarcely warm even the outside of the packing.

Ice may be kept in the simplest board shanty, provided it is encased on every side, including top and bottom, with sawdust, as shown in fig. 6.

Fig. 7 represents a rough and cheap structure, made by setting rough posts into the ground, (the ground plan of which is shown in fig. 5,) facing or straightening the inner sides, and then nailing common rough boards on them to a sufficient height. The floor is laid in a manner already described (page 25), and a board or slab roof placed as a covering. This will keep ice, if properly packed, as well as the most elaborate building. We have known a large family supplied all summer from such a structure, and a ton unused and unmelted thrown out in winter, to prepare it for a second filling.

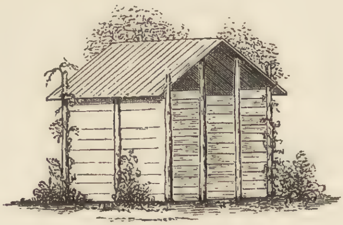


Fig. 7.—*Single Boarded Ice-House.*

Another cheap form is shown in fig. 8, where the boards are placed upright and secured in their places by timbers passing around them at

Fig. 8.—*Building with Vertical Boarding.*

the top, middle and bottom. Persons living near saw-mills in new countries might make the whole of slabs at a trifling cost, till something more finished could be provided.

More Costly Buildings.

The chief advantage of double walls, enclosing a packing of some non-conducting substance, is where the blocks of ice are more irregular in form, requiring a less uniform surrounding of sawdust, and less of it in thickness, than where there are single walls or boarding. But still in every case there should be some sawdust or packing inside and in contact with the ice, to prevent currents of air passing next to it and melting it. The simplest way for making a double-wall building, is to set posts for the outside, as in the plan fig. 5, and to place horizontal boards against them as already shown, in fig. 7, for single walls. Narrow studs are then set against this outside boarding, and a second board wall nailed to this studding.

If all the boards and timbers are thoroughly soaked with crude petroleum, by applying two or three coats with a whitewash brush, they will last many times longer. The lower portion of the posts which are in the ground may be made much more durable by dipping them in hot gas tar, carefully heated in a large boiler so as to avoid taking fire. Posts set in gravel, either in natural beds, or rammed in around them with a tile drain below, (fig. 9,) will last much longer than if set in a wet soil, or where the subsoil is liable to become occasionally water-soaked—fig. 10.

Fig. 9.—*Post well drained.*

Fig. 10.—*Post in water-soaked soil.*

An ornamental building, partaking somewhat of the rustic character, is shown in fig. 11. The posts may be made by selecting trees with a strong

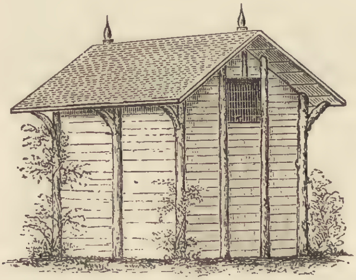


Fig. 11.—*Rough Ornamental Ice-house.*

side limb for the brace or bracket; or these may be more neatly supplied by setting in separately, as shown in fig. 12. The whole may be rendered very durable by giving it a thorough soaking of crude petroleum applied with a whitewash brush.

Fig. 12.—*Rustic Bracket.*

Side-hill ice-houses are more expensive, but they have the advantage of allowing the more easy filling of the upper part, by drawing the loads of ice to the upper side and passing the blocks through the upper door on that side, as shown in the engraving at the head of this article.

Fig. 13 represents a square roof ice-house, built at considerable expense, and rendered sufficiently finished to be placed among the trees of ornamental grounds.

Fig. 13.—*Ornamental Ice-house.*

In the preceding plans we have not given the dimensions of any of them. The size will vary with the requirements of each family, and every one,

knowing how much will be needed for a daily supply, will be able to make a proper estimate for himself. We have found an ice-house with an interior space 8 by 10 feet, including the sawdust packing, and holding less than ten tons, sufficient for a daily family supply through the season. A pile of ice 8 feet square and 7 feet high, if well managed, will be sufficient for a moderate family. The quantity can be increased to any desired amount for a more copious supply. If much is consumed in keeping cool an adjoining apartment, as a fruit or milk room, more will of course be needed. For the supply of the dairy (shown in fig. 15) two or three times the quantity to supply a family will be required, or some twelve feet square and ten or twelve feet high.

We have already described the simplest and easiest way to effect drainage—namely, through a stratum of sawdust on a loose floor. This answers well where the ground is gravelly and has a good natural drainage. But there may be cases where the surface is naturally more retentive of water, or where an apartment below would require a tight floor. Where this is the case, the floor may be laid as shown in fig. 14, being a few inches lower towards the centre, with a trough running towards one side. This will collect and carry off the water from the melting of the ice. But it is of vital importance that the pipe or opening through which this water flows should not admit warm air into the ice. It may therefore be made to pass through a lead tube, as already mentioned, which has a curve downward and up again, as in fig. 3. This curve is always filled with the escaping water, which will flow freely through it, while no air can pass this position upwards. Or a trap preventing the admission of the air is made by simply placing the lower end in a small vessel of water—fig. 4.

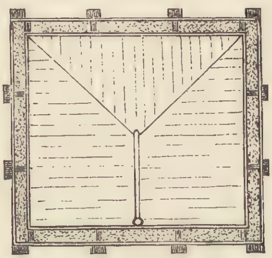


Fig. 14.—*Mode of Drainage for a Floor.*

Milk and Fruit Rooms.

We often receive inquiries for the best mode of building dairies and fruit rooms in connection with ice-houses. Fig. 15 is a plan of an ice-house and dairy connected; each part occupies about one-half of the oblong building. It is all above ground, which admits the necessary ventilation of the dairy. If the latter is made with double walls, enclosing a few inches of sawdust, the temperature may be kept as low as may be needed. For this purpose the upright cooling box or trunk, *A*, is placed

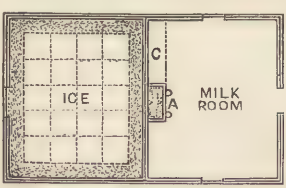


Fig. 15.—*Ice-house and Dairy.*

against the partition, so that it may be readily filled from the upper layer of ice, which is broken and thrown down from above. In this way no more ice is used or melted than is thrown down into it daily. It has a lid to cover the top or upper end; and when the ice becomes lower in the ice-house from using, a side door lower down, in this upright box, is used for the same purpose. When the broken ice is thrown in it soon cools the confined air nearly to freezing. The registers at the lower end of this box (shown at *B B* in fig. 16) are opened, and the cold air, being heavier than the surrounding air, flows out into the milk-room and cools it. By the use of two thermometers, one near the floor and the other two-thirds up, the temperature of this room may be regulated with much accuracy by turning the registers. These two registers being placed near the corners are less disturbed by the blocks of ice than one would be at the centre. Fig. 17 is a section of a side view of this box. Beneath the ice-box is a cupboard with double sides and doors, and it is kept nearly down to freezing by means of the galvanized iron or zinc bottom of the ice-box above. In this cupboard fresh meat, fruit, &c., may be kept a long time. If desired, this cupboard may be made wider than the ice-box, and contain more room; or the ice-box may be made larger, if a colder temperature is desired for the cupboard. The cold water which escapes from the melting ice in this box may be conveyed by a pipe with a curve, to serve as a trap, into a zinc trough standing at the bottom of the cupboard, in which any vessels may be set for thorough cooling; or it may be conducted into the trough *C* (fig. 15) in the milk-room, and in this, milk vessels may be set if desired.

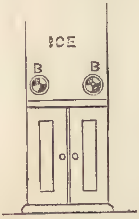


Fig. 16.—*Ice-box and Registers.*

Fig. 17—*Section of side view of Ice-box.*

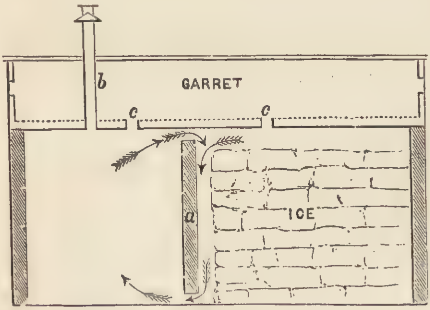


Fig. 18.

Dairy rooms are sometimes constructed with a partition only between these and the ice-room; but the temperature cannot be so well controlled, nor the rapid melting of the ice prevented, as by the mode which we have described, where the ice for cooling is first separated from the general mass.

Fig. 18 shows another mode for cooling a milk-room, but is more

wasteful of ice, and not so perfectly controllable as the one just described, although not requiring the labor of filling the ice box daily. The apartment on the left is used for milk or fruit, and on the right is the ice. The openings in the partition *A*, at the top and bottom, keep up a constant current against the ice in the direction shown by the arrows, the face of the ice on the left side being left bare and exposed. The two orifices at the top and bottom of the partition *a* may be closed with a sliding board or register, and will enable the attendant to control the temperature or increase or diminish the melting of the ice. The orifices *c c* are opened only when fresh air is to be admitted to supply the escape of foul air through the ventilating pipe *b*, and this pipe must also have a a register, to control the escape of the air.

For the purposes of an out-door refrigerator, or for keeping summer fruit fresh, where a lower temperature is necessary than for a milk-room, the plan figured and described on page 153 of the sixth volume of RURAL AFFAIRS may be adopted.

CULTURE OF THE FILBERT.

THE FILBERT has been little cultivated in this country. It may possibly succeed best in the cool seasons of the North. In England it is raised with great success. There are two modes of pruning—one represented in fig. 20, in which the pyramidal form is adopted, the bush being four or five feet high. The young bushes are first kept to a single stem for nearly a foot from the ground, and above this are pruned by leaving stumps or spurs at the base of the side shoots and eight or ten buds on the leader. When the growth is too rampant, they are well pruned, which increases their productiveness.

Fig. 19.

In Kent County, England, hundreds of acres are devoted to the filbert, and more than two hundred dollars have been received for an acre. Another method of pruning is there adopted, as shown in fig. 19, the following description of which was furnished by an English correspondent of the COUNTRY GENTLEMAN :

First, as to the shape of the tree when young: This is obtained by pruning once each year with knife and fine saw, and a man well adapted to the business, so as to produce fruit—fig. 19. They are pruned when at maturity so that you can see over the tops like looking over a field of wheat, and look as even. When young trees are wanted, those upright limbs—or, as they are called, wands—that grow on the body below the branches, are taken and bent down for layers, and twisted far enough from the body to be laid under the ground and then turned up, and about four or five joints of the shoots left for one year to get roots, and then set out to grow—fig. 21. A hooked stick is used to hold them to the earth. They are never plowed between, but spaded, and in autumn before the leaves fall, the earth is opened and thrown back about three feet from the body all around with the hoe. In the spring they are pruned just as soon as we can see the bud or blossom, and no more done, except hoeing, until gathered in the fall. The

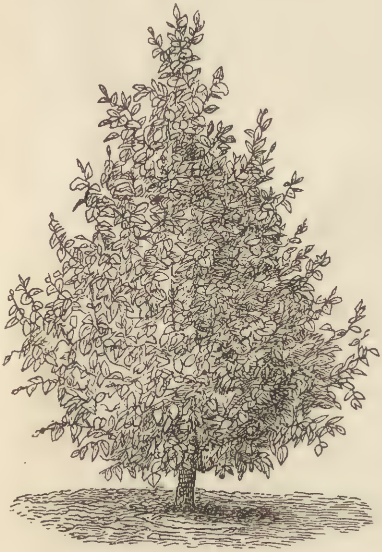


Fig. 20.

Fig. 21.

nuts are taken into shelter and picked over as the market demands, with hulls on them. I believe they would be a very profitable crop in this

country. They are not often planted alone, but grow in the rows with apple and pear trees. The layers when one year old, are broken from the body and cut off, so as to leave the roots, and set out in rows until wanted to plant. The nuts are sent to London and sold by the hundredweight. When full grown the bushes are 6 feet across. These limbs do not all start from the body, but are pruned so as to form a flat top, or nearly, and the tree round.

Fig. 22.—*Cluster of the Black Hamburgh Grape weighing 17 pounds*—*see page* 41.

SKETCHES AND PORTRAITS OF FRUIT.

THERE ARE MANY OF OUR FINE FRUITS so marked and distinct in their outlines that engraved miniature portraits, if executed with accuracy, will give a very fair representation of their appearance and characteristics, in the same way that a miniature of the human face enables us at once to recognize an acquaintance. We have accord-

ingly prepared a number of such engravings, in order to assist in noticing some of our best or most popular sorts, or those worthy of attention for valuable qualities.

Pears.

Clapp's Favorite, (fig. 23.)—This is a new variety which originated near Boston, and is supposed to be a cross between Flemish Beauty and Bartlett. The growth of the tree is like the Flemish Beauty; the form and size of the pear resemble the Bartlett. It is large, oblong pyriform, pale yellow, marbled and splashed with light reddish brown. The flesh is juicy, melting, sweet, and of very good quality. It ripens at the end of summer at the North, about a week before the Bartlett, and should be gathered at least a week before full maturity, to prevent rotting at the core. No new pear has gained favor more rapidly than this, and in the catalogue of the American Pomological Society, it is recommended for general cultivation in ten States, and as promising in eight others.

Fig. 23.—*Clapp's Favorite.*

Doyenne du Comice, (fig. 24.)—This pear originated in France. It is rather large in size, roundish pyriform, becoming clear yellow at maturity, with some markings of russet; the flesh is white, juicy and melting, slightly aromatic, sweet and rich. It ripens late in autumn. It is one of the most promising of all the newer pears, and maintains its excellence of quality both in this country and in Europe.

Fig. 24.—*Doyenne du Comice.*

Beurre Superfin, (fig. 25.)—This is another autumn pear of French origin, which proves of excellence and value in this country. It is medium, often large in size, obovate, approaching pyriform, with the neck narrowing to the fleshy stem; in color greenish yellow, with some russet, often with a reddish brown cheek; exceedingly juicy and melting, with a rich, vinous flavor. It grows vigorously on the quince, and is one of the very few sorts which succeed perfectly as a dwarf.

Fig. 25.—*Beurre Superfin.*

The Sheldon, (fig. 26,) is an American pear, originating in New-York. It is medium in size, occasionally large, roundish; the whole

surface more or less russeted on a greenish yellow skin, which is sometimes a rich brownish red in the the sun. The flesh is very juicy and melting, with an excellent aromatic flavor when at its best, but sometimes not so good. Like Beurre Giffard, Flemish Beauty, Clapp's Favorite and some other sorts, it should be gathered early to prevent rotting at the core. It has a very high reputation, and is recommended by the American Pomological Society in twenty States, and very highly in eight of these.

Fig. 26.—*Sheldon.*

Fig. 27.—*Josephine de Malines.*

Josephine de Malines, (fig. 27.)—An excellent mid-winter pear, of medium size, broad oblate-pyriform, sometimes roundish and flattened. It is pale yellow at maturity, often with nettings and patches of russet. The flesh is white, slightly tinged with rose or salmon towards the centre; juicy and melting, sweet, agreeable, and slightly aromatic. It usually keeps till mid-winter before ripening, and often a month or two later. It possesses the desirable quality of keeping for some time after it becomes mellow. The tree is a rather slender and moderate grower, but quite hardy; a good bearer. Where it ripens well, and on soils properly adapted to it, it is one of the best in quality of all pears, and is especially valuable as a mid-winter sort, maturing after Winter Nelis, Lawrence and others.

Beurre d'Anjou, (fig. 28.)—An autumn and winter pear of the highest reputation. Its origin is Belgium. It is large in size, blunt obovate, approaching pyriform, of a greenish yellow color, sometimes with a brownish blush; the flesh is buttery and melting, with an excellent flavor. If kept in a warm apartment, it will ripen in October; in a cool place it will frequently last till mid-winter. One of the most profitable for market, fine specimens often selling for thirty dollars per barrel. It is reported as succeeding in twenty-nine of the States, in fifteen of which it is recommended as of the highest value.

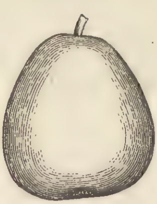


Fig. 28.
Beurre d'Anjou.

Fig. 29.
Duchesse d'Angouleme.

There are two quite large late autumn pears, of older origin or introduction than the preceding, and which are well worthy of notice. One is the

Duchesse d'Angouleme, (fig. 29,) a very large obtuse obovate-pyriform,

knobby fruit, dull greenish yellow, buttery and melting, and excellent in quality when large and well grown; poor and flavorless when smaller than four ounces. It ripens about mid-autumn; the tree is a very healthy and vigorous grower on quince, and next to the Bartlett it is the most popular market pear in the country. It is recommended in twenty-nine States, and as eminently valuable in eighteen of these.

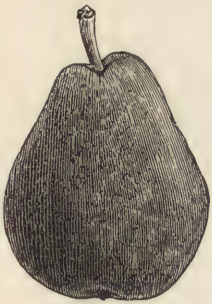


Fig. 30.—*Beurre Diel.*

BEURRE DIEL, (fig. 30.)—A Belgian pear, large, obtuse pyriform, rather rough with some russet; a rich yellow when fully ripened; the flesh yellowish white, large grained, buttery and half-melting; sweet and excellent. It ripens during the last half of autumn. The tree is a strong grower, and a fair bearer, and when not affected by black knot on the fruit, a profitable market sort, growing freely as a dwarf on the quince.

There are a number of other pears worthy of being named in this connection, although some of them do not stand quite so high as the most popular of the preceding. Among the best may be mentioned Beurre Bosc, Belle Lucrative, De Tongres, Doyenne Boussock, Mount Vernon, Dana's Hovey, Washington, Howell, &c.

APPLES.

EARLY STRAWBERRY, (fig. 31,) formerly called *American Red Juneating*—a small, roundish, conical fruit, with a long stem; is a beautiful, quite early apple, of good quality, and the tree a handsome, upright grower.

Fig. 31.—*Early Strawberry.*

Fig. 32.—*Carolina Red June.*

Fig. 33.—*Keswick Codlin.*

The skin is striped and shaded with a fine red; the flesh white, often tinged red next the skin, and with a sprightly, pleasant, sub-acid flavor. An abundant bearer.

CAROLINA RED JUNE, (fig. 32.)—This is a valuable early apple through the South and Southwest. It is medium or rather small in size, ovate-conic, with a broad, purplish red cheek on a yellow skin; flesh tender, brisk sub-acid.

KESWICK CODLIN, (fig. 33.)—Medium or rather large, roundish ovate,

greenish yellow ; flesh juicy, pleasant sub-acid ; of moderate quality as a table fruit, but an excellent and valuable cooking and market apple, ripening early in autumn.

KIRKBRIDGE WHITE, (fig. 30)—Known also as *Yellow June*—is an early apple, highly esteemed in some of the western States for its fair appearance and great productiveness. It is medium in size, peculiar in shape, tapering to base and apex like a barrel, equally blunt at each end ; skin smooth, pale yellow ; flesh tender, fine grained, with a moderately good, sub-acid flavor. It ripens soon after Early Harvest, and for six weeks.

Fig. 34.
Kirkbridge White.

Fig. 35.
Chenango Strawberry.

CHENANGO STRAWBERRY, (fig. 35)—called also *Sherwood's Favorite*—a valuable new early autumn variety, which originated in Central New-York. In size above medium, oblong-conic, handsomely striped and mottled with red ; flesh rich, aromatic, very good. Tree a fine upright grower and early bearer.

GRAVENSTEIN, (fig. 36.)—A German apple, introduced some forty years ago, and now widely disseminated in this country. It is rather large, roundish, somewhat flattened at the ends ; skin striped with light red ; flesh crisp and juicy, with an excellent sub-acid flavor. Tree moderately vigorous, upright, the side shoots curving upwards. It ripens before or at mid-autumn, but may be kept into winter.

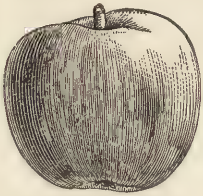


Fig. 36.—*Gravenstein.*

Fig. 37.—*Melon.*

MELON, (fig. 37.)—This apple originated in Western New-York. Medium in size, roundish oblate-conical, striped and splashed with red on pale yellow, and sometimes marked with traces of russet. The flesh is white, tender, sub-acid, aromatic, of excellent quality ; tree a slow grower and medium bearer ; ripens in autumn, and will keep till mid-winter.

Fig. 38.
Lady Apple.

LADY APPLE, (fig. 38.)—A French fruit. It is very small in size, oblate, with a fine deep red cheek on a lemon yellow skin ; flesh white, crisp, tender, pleasant. Mid-winter. Tree a small, slender grower, upright, very productive. A profitable sort for city markets.

Ben Davis, (fig. 39.)—This is as popular at the West as the Baldwin at the East. It is rather large in size, roundish conical, smooth and regular; striped and splashed with light red on yellow skin; the flesh is tender, juicy, mild sub-acid, of medium flavor. It ripens through winter. The productiveness of the tree, and the handsome and fair appearance of the fruit, render it eminently popular at the West and Southwest.


Fig. 39.—*Ben Davis.*


Fig. 40.—*Wealthy.*


Fig. 41.—*Jonathan.*

Wealthy, (fig. 40.)—A very hardy new sort, enduring the winters in Minnesota, where most other apples are killed by the cold. It is medium in size, roundish oblate, striped; the flesh white, fine grained, tender, lively sub-acid, very good in quality.

Jonathan, (fig. 41.)—Origin, Eastern New-York. Size medium, sometimes rather small, roundish ovate, handsomely striped and mottled with red on a yellow skin; flesh white, fine grained, juicy, sprightly sub-acid, excellent in quality. Ripens through winter into spring. Tree a slender grower, but succeeds well when grafted standard height into other sorts.

Northern Spy, (fig. 42.)—Origin, Western New-York. A well-known, excellent, long-keeping apple, of large size, roundish conical, often approaching oblate, handsomely striped and distinguished by the round, deep basin at the apex. The flesh is fine grained, tender, sub-acid, aromatic, and of excellent quality. A tardy bearer, but afterwards productive. Requires a rich soil and good cultivation to produce large, fair fruit.

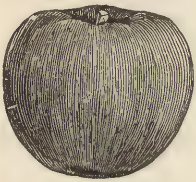


Fig. 42.—*Northern Spy.*

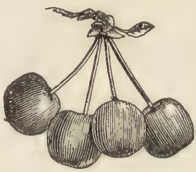


Fig. 43.—*Siberian Crab.*

Siberian Crab, (fig. 43.)—The small, old sort has been long known and cultivated, partly for the ornament of its rich clusters of beautiful fruit, and partly for the manufacture of jellies. Of late years, many greatly improved varieties have been originated, more or less crossed with the pollen of the common apple. These new sorts vary in size from $1\frac{1}{2}$ to 2 inches in diameter, and a few of them are of excellent quality. The extreme hardiness of the Siberian crab has rendered these new sorts desirable for cultivation in the more northern portions of our country, where the severe winters are too hard on most of the varieties of the common apple. Among the

hundreds of new sorts, some are excellent as table fruit, but it will require some years of trial to determine which are likely to prove the most valuable and worthy of extended cultivation.

Plums.

There have been three periods in the history of the plum; the first, during the early part of the present century, when it grew freely and bore abundantly, without interference; the second, when the incursions of the curculio discouraged nearly all cultivators from planting; and the third, now opening, when contrivances for destroying effectually these insects are rendering the culture of the plum comparatively easy again. The Damson, from its productiveness and ready sale, is becoming extensively planted in regions where the plum naturally grows well. To show its prolific character, we give a cut of the Rochester Prolific (fig. 44), a new English variety.

Fig. 44.—*Rochester Prolific Damson.*

Early Peaches.

There are several new varieties of the peach which are earlier than any previously known, and which will give supplies of this excellent fruit some two weeks sooner than were formerly afforded by Hale's Early. Thomas Rivers of England has produced and named three sorts, all of which are very early, and have proved valuable in this country. The earliest is

Fig. 45.—*Early Beatrice.*

Early Beatrice, (fig. 45,) which is a free grower and good bearer, and the fruit, although rather small in size, is beautiful in appearance, and excellent in quality. It ripens about ten days sooner than Hale.

Fig. 46.—*Early Louise.*

Early Louise, (fig. 46,) is rather larger, but not quite so early.

AMSDEN'S EARLY, (fig. 47,) is a new and very promising sort, which originated at Carthage, in Missouri. It is of full medium size, round, and of excellent quality, ripening fully two weeks before Hale's Early. (The cut does not do justice to this handsome fruit.)


Fig. 47.—*Amsden Peach.*

CHERRIES.

The most widely popular cherries in the eastern, middle and western States, are the Dukes and Morellos, the Mayduke being reported by the American Pomological Society as a valuable fruit in twenty-two States, and the Early Richmond in twenty-six States. The Archduke, Belle de Choisy and Morello stand high in seventeen States. The Morello (fig. 48) has the advantage over most other sorts, in its extreme hardiness, having escaped unhurt in severe winters in the northwestern States, when the Early Richmond and others were much injured.

Of the heart varieties, the Black Tartarian is the most widely popular, and next to this the Napoleon and Black Eagle—(fig. 49)—the former for its large size and showy appearance, and the latter for its excellent flavor. Coe's Transparent is also an excellent sort of high reputation. The cherry fails in the southern States.


Fig. 48.—*Morello Cherry.*


Fig. 49.—*Black Eagle.*

CURRANTS.

Among the several new sorts of this fruit, which have obtained a high place among cultivators, none have exceeded in general value the old *White Dutch*, (fig. 50.) The *White Grape* is much larger, but the bush is a more feeble grower. For market, the large red varieties, such as the *Cherry*, *Versailles*, *Fertile de Palnau*, &c., prove most profitable.


Fig. 50.—*White Dutch Currant.*

BLACK HAMBURGH GRAPE.

At the head of this article, page 34, we give an illustration representing a curiosity in the form of an immense cluster of the Black

Hamburgh grape, raised a year or two since in England, and weighing seventeen pounds, the several shoulders being tied apart or extended. This great size was effected by very highly enriching the soil by means of liquid manure, and by giving the whole strength of the bearing shoot to a single bunch.

Fig. 51.
Black Hamburgh—(common size.)

Fig. 51 represents the appearance of a bunch as raised under common cultivation, and weighing a pound or two, which we present for contrast. The largest bunches we have seen in this country weighed five pounds, and the shoulders being tied apart, the breadth from extreme points measured fourteen inches.

SOME BENEFICIAL INSECTS.

By Prof. A. J. Cook, of the Michigan State Agricultural College.

IT IS WELL KNOWN to those who have made insect life and habits a study, that very many insects, often whole families, and in one case nearly an entire sub-order, live exclusively upon other insects, which they capture and destroy. And as these insects thus preyed upon are very often the most dreaded pests of the farm and orchard, this subject becomes one of great economic interest and importance.

Many of our noxious insects exist in such infinite numbers that to cope with them by artificial remedies is absolutely impossible, as instanced by the May beetle and western grasshopper. Other insects, like the cut-worms and borers, are so well concealed that even their presence is past finding out. Hence it will be seen how dependent we are on natural protection; and thus it is that these beneficial insects, with their most effective colleagues, the birds, become the farmers' and fruit-growers' most important assistants.

We now see very readily that it is a matter of imperative necessity that the husbandman, if he would reap the best success, should know friend from enemy, that he may spare, aye, protect and foster the one, while he essays to exterminate the other. That more knowledge is necessary to insure wise action has met frequent proof in the writer's immediate observation.

A farmer was one day noticed destroying our fine copper-dotted ground beetles, supposing them to be the cause of his vegetables being cut off in his garden, whereas the larvæ of the same beetles were even then preying upon cut-worms, which were the real culprits. Again, a lady was collecting the beautiful lady-bird beetles, so attractive in their orange dress beaded with black, and demonstrating her belief in cremation, because she ignorantly supposed them to be the cause of the withered appearance of her rose bushes, when in truth the beetles were feeding on the minute lice, which were actually sucking the very life from her beautiful plants.

The object of the present article is to help towards a better understanding of these insect friends, that a wiser discrimination may be practiced by those desirous of practically solving the great insect problem.

As the object of the writer, at this time, is to give practical rather than scientific instruction, all technical terms and scientific exposition will be avoided, except in so far as needed to serve the immediate purpose. The following definitions and remarks upon insect changes during growth and development, and upon classification, are indispensable to our purpose.

Definitions.

The horn-like appendages, when they are very long, which project from between or below the eyes of all insects, are called *antennæ*. The jaws of insects are the sharp, often toothed, organs situated on either side of the mouth, and are remarkable for their lateral or sidewise movement in chewing, instead of the up and downward movement so familiar in all the larger animals. The body of insects is divided into three well-marked portions, (see fig. 53.) First—the head, which contains the eyes, antennæ, jaws, mouth, etc. Second—the thorax, which is usually in part concealed by the wings, which, together with the legs, are always attached to it. The anterior limit of the thorax, or the line of division between it and the head, is plainly marked ; not so with the posterior limit. Yet remembering that the legs and wings find attachment to this part, we may, by careful examination, feel certain as to the division. The third portion is called the abdomen. This is conical, usually set close on to the thorax, though often attached by a long stem or peduncle, (see fig. 54.) This contains, near the extremity, the male and female organs, and in many females there is projecting from the tip a long ovipositor, a tube by which the eggs are placed in position (see fig. 58.) This frequently is composed of different rings, so that it can draw in or push out like the sections of a spy-glass. Besides this there are, in both males and females of a few insects, thread-like appendages projecting from the end of the abdomen. These, often two, sometimes three, are called *setæ*. But usually the abdomen is smooth, entirely without appendages. Most insects possess four wings, though a few have but two, and still a few are entirely destitute. The wings placed farthest forward are called the primaries ; those farther back the secondaries. These important members are membranous, and supported by a

strong framework, called the veins. These nearly all run lengthwise of the wings in the higher groups, while in the lower ones there are very numerous cross veins, making the wings resemble lace. Such wings are called net-veined.

Insect Transformations.

There is nothing in nature more wonderful than the changes which insects undergo in the process of growth and development (see fig. 69.) It is wonderful that the sluggish, repugnant maggot, reveling in filth, will one day burst forth as an active, gaily attired fly, with habits so refined that it were no wonder if she should blush to acknowledge her own offspring; or again, that the crawling, obscure, often repulsive caterpillar is soon to flit forth as the gaudily-robed, gauzy-winged, almost ethereal butterfly. What wonder that the study of such marvelous and interesting changes should be fraught with the most wholesome and beneficial influences?

Larva State.—All insects, when they first hatch are cylindrical worm-like creatures, and are called *larvæ*, singular *larva* (see fig. 65.) They are often called worms, improperly though, for worms always remain in this shape and condition. The earth worm or angle-worm is properly called a worm. In the grub, the maggot, and the caterpillar we have examples of larvæ—the first stage in the development of insects. The entire growth of many insects takes place while in the larval state, hence, as we should expect, the eating is principally done at this time, so that most insects work their mischief, or effect their benefits while in the larval state. These insect youths are so ravenous that they really eat till they burst; the skin being so firm that it will not yield, as the growth goes on, it splits open, and the larva is virtually skinned alive. After doffing the old, unyielding skin, and donning a new one that is less firm, growth goes on till it is necessary to burst again. Thus there are from three to ten of these moults or skin shedding experiences. When the larva is full grown, it leaves off eating, usually betakes itself to some secluded place in the earth, or some crevice, forms a covering either of silk, which it spins from its own mouth, or of chips or earth, called a cocoon, and in this assumes the—

Pupa Stage.—Most insects, during the pupa state (see fig. 66, middle fig.,) are perfectly quiet, possessing neither sense, organs, mouth nor members, hence take no food, and have but little power to move. After remaining in this condition from a few days to as many months (the time varying with the kind of insect, and often in the same species with the climate) the pupa skin bursts, the cocoon is moistened by a peculiar fluid, secreted for the purpose, and the insect, thus enabled to come forth from its pupal prison, issues fully matured, often beautifully decked, and is now known as an—

Imago.—The insect now (see fig. 53) has its full complement of six legs, and with few exceptions, its well developed wings, usually four in number,

though sometimes only two, its large, compound eyes, each consisting often of many hundreds of simple eyes, and its variously shaped antennæ often projecting like horns from the head. Some imagos or mature insects take no food; hence the mouth parts are abortive, or but slightly developed. The common horse bot-fly is a good example, as the mouth parts are exceedingly rudimentary. Many moths take little or no food, and their mouth parts are correspondingly abbreviated. On the other hand, many insects, like the Colorado potato beetle, contrary to what has been frequently stated, eat as voraciously while imagos as when in the larval state.

Of course the chief object of mature insects is to mate, and deposit eggs preparatory to the continuance of the species, and though there is no growth at this time, still the long life and great activity of many insects, especially beetles, as well illustrated in the curculio, necessitate much food taking, and well developed mouth parts.

Complete and Incomplete Transformations.—While the changes in most insects are decided and well marked, as indicated in the above descriptions, in which case the transformations are said to be complete, (see fig. 66,) yet in large numbers of insects the larva, pupa and imago differ, not in habits, as all are ravenous feeders and live on the same kind of food, but in these insects, which are said to have incomplete or imperfect transformations, there is such a strong resemblance between the larvæ, pupæ and imagos, that no one would find difficulty in recognizing the correct relationship. The larva is without wings, and of small size. The pupa possesses stubs of wings, and is of larger growth, while the imago is still larger, becomes fully grown and is fully equipped with wings, being frequently able to sustain itself in long, continuous flights. Insects with incomplete transformations are well illustrated in the bugs and locusts or grasshoppers.

Classification.

Insects as an order may be distinguished by their transformations, the possession of six legs, wings, antennæ and compound eyes in the mature stage. The triple division of the body into head, thorax and abdomen, is also peculiar to this order. The lower order, spiders and myriapods, have only two divisions to the body, and differ from insects in all the above particulars, except that myriapods or thousand-legged worms, though not worms at all, possess antennæ. Spiders have always eight legs when fully matured, while myriapods (fig. 52) may have more than a hundred.

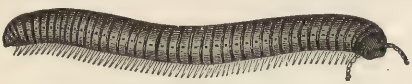


Fig. 52.—*Julus.**

The order "insects" may be divided into seven sub-orders, often called

*The most of the cuts illustrating this article are from the skillful pencil of Prof. C. V. Riley, and so need no word of commendation as to their accuracy.

orders, yet more properly sub-orders, as first suggested by Lenckart, and afterwards approved by Agassiz, Dana and Packard.

HYMENOPTERA—BEES, WASPS, ETC.—The Hymenoptera, (see fig. 53,) as indicated by the name, possess membranous wings, four in number, very complete transformations (the larvæ often being nearly motionless, without legs, and much like maggots) and are provided with very perfect mouth parts, consisting of both jaws and a sucking tube. Thus a bee or wasp may sip liquid or grasp with their strong jaws.

LEPIDOPTERA—BUTTERFLIES AND MOTHS.—The word Lepidoptera indicates wings with scales, a feature belonging exclusively to insects of this sub-order. These scales overlap each other like shingles on a roof, are variously colored, and under the microscope are exceedingly beautiful. The wings are four in number, though a few females are wingless. The transformations are perfect, for who would dream that the sluggish caterpillar could become the gay flitting butterfly. The larvæ almost always possess sixteen legs, and are called caterpillars. The pupæ are often very brilliantly colored, and for this reason are called chrysalids. In butterflies these are suspended by a thread, while in moths they are surrounded by a cocoon, either of silk or earth, or other substance. They have only rudimentary jaws, but are generally provided with a well developed sucking tube.

DIPTERA—FLIES.—As the name indicates, these (see fig. 61) possess only two wings. They have perfect transformations. The larvæ are footless, and are called maggots. Many of these have no mouth, but absorb the food through the body walls, as instanced by those old scourges, the maggots of the Hessian fly, and midge. Many pupate in the last larval skin, are the form of flaxseed, and generally of a brown color. Here, too, the mouth parts take the form of a beak or sucking tube, which will need no words of commendation as an effective instrument other than the mere mention of mosquitoes and fleas.

COLEOPTERA—BEETLES.—The two upper wings in this sub-order (see fig. 64) are thick, forming a sheath which covers the lower ones when at rest; hence the name, which means sheathed wings. These primary wings are probably of little use in flying. The transformations are complete, as the grubs, a name applied to the larvæ of beetles, are still worm-like, and possess six legs. The pupa much resembles the imago, the wings and legs being folded beneath the body. The Coleoptera possess strong jaws and no sucking tube, and feed often quite as ravenously in the imago state as while larvæ.

HEMIPTERA—BUGS, LICE, ETC.—The base of the primary wings in many of the insects of this sub-order (see fig. 68) are thick and opaque at the base, and transparent at the extremity, this giving the appearance of half wings; hence the name. The bugs are characterized by incomplete transformations, for the louse and bug, no matter how small, could not deceive even the novice as to their real character. These insects possess strong

beaks, and are great suckers, not only destroying our plants at wholesale rates, but frequently thirsting for blood, even human blood, as experiences in childhood and hotels afford disagreeable proof.

ORTHOPTERA—LOCUSTS, GRASSHOPPERS, ETC.—This word, signifying straight-winged, refers to the upper or primary wings of many of the sub-order, which are narrow and straight; the other wings, usually folded up fan-like, are very ample and are fully able to sustain these insects in their long flights, though unaided. Their transformations are imperfect, as no one could mistake a grasshopper for aught else, though it had but just come forth from the egg. Grasshoppers and their allies possess very strong and effective jaws, with which they are even able to strip the bark from the twigs of trees and shrubs.

NEUROPTERA—LACE-WINGS.—These insects (see fig. 69) are very readily determined by their net-veined wings, the very numerous cross veins making them resemble lace. This is also true of the posterior or secondary wings of the orthoptera, but in the neuroptera it is true of all four of the wings. If point lace is so rich and beautiful, it must be copied after these natural fabrics, the neuropterous wings, for it is truly impossible to imagine anything more exquisite than some of the delicate lace wings of neuroptera. The transformations are usually incomplete. That in many cases the reverse is true, is only another proof that nature delights in variety. The mouth-parts are like the same in coleoptera and orthoptera —consisting of very formidable jaws.

Thus, with these natural groups before us, we are prepared to discuss understandingly those insects which, by their parasitic or predaceous habits, are constantly aiding us in this great battle with the vast host of our liliputian foes.

PARASITIC AND PREDACEOUS INSECTS.

In the following discussion I shall use the word parasitic to designate those insects which deposit their eggs upon other insects. The insects which hatch from these eggs live during the larval period in the bodies of their hosts, eating their substance, and of course destroying their lives. Parasitic insects then do their good work as larvæ, eating up the various insect enemies of the farmer and fruit-grower.

Predaceous insects, on the other hand, work their benefits by catching and eating the pests of the farm and orchard as the lion catches and eats his prey, and may work their good work in all stages if the insects have incomplete transformations, and in both larval and imago stages, where the transformations are complete. Some insects lead a predatory life only as larvæ, while others only prey upon other insects as imagos.

HYMENOPTEROUS FRIENDS.—Though the Hymenoptera furnish us such injurious pests as the joint-worm and the various slugs which make the saw-fly family one of the most dreaded among insects, yet this sub-order furnishes far more insects that appear in the role of benefactors.

For, not to mention the bees and gall flies, which furnish such valuable commercial articles, we still have a goodly number whose numerous species are almost wholly engaged in exterminating the most noxious pests of the farm and garden.

WASPS.—If we consider as venial, the injuries wrought by the strong-jawed insects belonging to the several families of the wasps, upon our grapes and other tender skinned fruits—which sin is often laid to the bees—we may regard the wasps as wholly our friends. Not only the paper-making wasps, but also the numerous mud wasps, are without exception, so far as the writer has observed, predaceous insects. And what a strange instinct it must be that leads many of these wasps to spread for their prospective young a rich feast of tender grasshopper steak or cut-worm chops, when forsooth they never deign even to taste such vulgar viands, but only lap the more delicate sweets distilled by leaf and flower! Yet the common bee is just as wise, aye, and thoughtful too of its young, as it gathers the pollen nourishment for their sustenance, while it only tastes the delicious sweets of the hive.

Fig. 53.—*Vespa maculata*.

The paper wasps, *Vespa maculata*, (fig. 53,) place the insect food in the cells with their young, while the fine mud wasps so common around wells and muddy places throughout our country, build large, roomy mud cells, in which they place the caterpillar, locust, or other insect, and then close up the cell, but not till they have left an egg with the canned meat. What a striking example of parental care thus to seal up so carefully the aliment provided for the young wasps, which very likely the parent wasp would never see! Yet in the Sphegidæ, *Sphex ichneumonea*, (fig. 54,) those beautiful shining wasps, with a long peduncle to the abdomen, and often so handsomely colored with blue, orange, yellow or red, we see even a more striking

Fig. 54.—*Sphex ichneumonea*.

example of parental care. These wasps are possessed, like all other species of wasps, of a powerful sting; yet when they attack and subdue their prey, preparatory to supplying the yet unborn, they never give a fatal thrust, but only paralyze their victims. These are then carried to a previously prepared hole in the ground, placed in its bottom, in company with an egg, after which the earth is filled in, and what is very curious, the wasp uses her abdomen as a beetle, pounding down the earth, so that by no possibility may her prospective offspring meet with disturbance. Here, then, the grub, caterpillar or moth is not only buried alive, but is to be eaten alive. So extraordinary is the mother's instinct or parental foresight that her yet unhatched progeny is insured not only a perfect sanctuary for a home, but also meat that is fresh and untainted.

Hymenopterous Parasites.

It is well known to all good observers of nature, as well as to the entomologist, that very many of our otherwise most destructive insects are held in check by the great host of parasitic insects, the large majority of which belong to the hymenoptera. In fact we can form no idea of our great indebtedness to these friends. Their benefits rival, if not surpass, those of the birds. Noxious insects may be so wide-spread and abundant, or so wonderfully concealed, that even the most pains-taking and skillful device of man may utterly fail to foil their attempts to work ruin, but as large a host of parasites, wise by instinct to seek out the most secluded nooks, or to gain access by boring or digging to the most secure insect home, are ever ready to come to the rescue of the needy husbandman.

There are four large and very important families of parasites among the hymenoptera—the egg parasites or proctotrypids (*Proctotrypidæ*), the beautifully colored chrysis or cuckoo flies (*Chrysididæ*), the very useful chalcid flies (*Chalcididæ*), and last, but perhaps best of all, the great host of ichneumon flies (*Ichneumonidæ.*)

Proctotrypids—Egg Parasites.—The insects of this family are very minute, scarcely ever exceeding a quarter of an inch in length. They are usually black, and may be caught in great numbers by sweeping a net over the grass, or along sand banks.

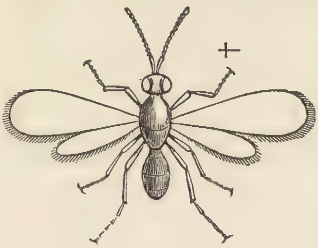


Fig. 55.—*Platygaster.*

The genus *Platygaster*, (fig. 55,) which includes a large number of species, destroys such enemies as the canker worm, Hessian fly and wheat midge.

As these insects frequently destroy the eggs of other insects, the larvæ feeding upon these eggs rather than upon the insects themselves, the name egg parasites is not inappropriate.

Chrysis Flies—Cuckoo Flies.—These insects, *Chrysis hilaris*, (fig. 56,) much resemble the common house-fly in form, are often of a beautiful green or blue, and when disturbed roll themselves up into a ball, by bending the abdomen under the thorax. This family is small, and thus of less importance than any of the others.

Fig. 56.—*Chrysis hilaris.*

Chalcis Flies.—If we except the joint-worm, all the insects of this family, so far as the writer knows, are beneficial; and the extent of their benefits can only be appreciated by the working entomologist, who soon learns to expect that almost any insect in his breeding case may yield a chalcis fly instead of what he had been promised by the larva. These insects are small, have compact bodies, which somewhat resemble the same in wasps and ants, and are often, as the name implies, of a metallic hue and lustre. One of these, *Aphelinus mitilaspidis*, (fig. 57,) a parasite on the apple-tree bark louse, discovered by Dr. Le Baron, can easily be transported to any place where this pest of the apple orchard may exist.

Fig. 57.—*Aphelinus mitilaspidis.*

Ichneumon Flies.—The insects of this most important family may readily be told by their long, slender abdomen, and their long projecting ovipositor. They are variously colored, and from their variety in this respect, great numbers, peculiar form, wondrous instincts, and beneficial habits, the family *Ichneumonidæ* can hardly be surpassed in the interest which their study affords, either to the scientific or to the practical man.

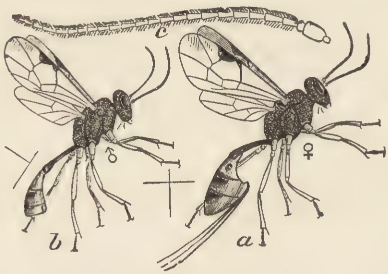


Fig. 58.—*Curculio Parasite.*

What was said of the *Chalcididæ* is illustrated even more strikingly by the ichneumons. The army worm, the tent caterpillar, the potato beetle, and even the curculio, are not without ichneumon foes. We can scarcely put several of any species of injurious insects into our breeding cases without obtaining specimens of these most important parasites, which have destroyed their hosts, and seem to regard us as if expectant of grateful acknowledgments. Sometimes several will be obtained from a

single insect, and frequently from several caterpillars not a single moth will be obtained, all being destroyed by these active little friends. This is especially true of the tent caterpillar and army-worm. We thus understand why the army-worm may be exceedingly abundant one year and hardly put in an appearance the next season.

What a wondrous sense or instinct that must be which guides these ichneumon flies to their victims, concealed, as the latter frequently are, in wood, earth and fruits! Yet once found, how certainly they receive the fatal thrust which leaves the germ of destruction! How could the ichneumon be better prepared to distribute the fatal eggs? Her long ovipositor could hardly be excelled for the purpose.

The finding of eggs on our insect foes—on the larva, pupa or imago—as so frequently seen on the Colorado potato beetle of late, is very encouraging, as also the finding of smaller cocoons in larger ones, as indicative of the presence of these ichneumon friends. In destroying pupæ, as we frequently do, (as instanced in fighting the rape butterfly,) chrysalids or cocoons thus inhabited should never be molested, for in preserving them we set at liberty destroyers that are far more efficient than we can ever hope to be.

LEPIDOPTERA.—The butterflies and moths are almost without exception herbivorous, and hence are all injurious to vegetation, and if they feed on plants that are valued, are noxious insects. We have therefore nothing to do with these insects in this article. To be sure a few—the silk moths —are valuable, but by furnishing commercial products, not as parasites, nor yet as predaceous insects. Hence, though we must always admire the lepidoptera for their surpassing beauty of coloring and grace of movement, still we must ever reckon them among the most grievous pests of the farm and orchard.

DIPTERA—TWO-WINGED FLIES.—As the farmer thinks of mosquitoes, fleas, house-flies, meat-flies, horse-flies, bot-flies and cheese-flies, especially if he has had any experience with the wheat-flies and the vexatious radish, onion and cabbage flies, what wonder if he asks: Can there any good come out of diptera? Yet not all diptera are to be condemned. Not only do we have the larval mosquitoes to filch the malarious germs from the stagnant pools, and larval flies to act as most welcome scavengers, but the diptera also furnish a goodly number of parasites, and even more—predaceous species. Though there are several families that are predaceous, we shall only mention the two most important.

Fig. 59.
Heliophilus latifrons.

THE SYRPHIDÆ.—These flies, *Heliophilus latifrons*, (fig. 59,) are very gaily colored, and may be caught on flowers in the hot sunshine. They are very active, and their sprightly appearance, together with their bright bands, often of dazzling yellow, is sufficient to strike the attention of the least observing.

These syrphus insects work their benefits while in the larval state. The mother fly places her egg in the midst of those terrible pests the plant lice, "which hatches out a footless, eyeless, flattened, transversely wrinkled, gaily colored green and purple maggot, having a very extensile body, which enables it to reach up and grasp the aphis (fig. 60) with its peculiar sucking mouth-parts." Few things in nature are more interesting than the capturing by these maggots of the ever present aphis, followed by lifting them high in air, and sucking out their life blood, and casting their worthless carcasses to the winds. Is it too much to say, "Well done, good and faithful servant?"

Fig. 60.
Syrphus Fly Larva.

The Asilidæ Family.—These large, stout flies are called "robbers" in Germany, a good name if the word can be used without opprobrium. They may be readily known by their large, stout bodies and tapering abdomens, and are hardly to be excelled in their predatory character. I once saw one attack and overcome a fierce, strong tiger-beetle. No sooner had the fly captured the beetle than I took possession of both. Yet even this did not cause the fly to release the beetle; not even death parted them, and they are now pinned in the college museum in the very position in which they were captured.

Fig. 61.—*Missouri Bee-Killer.*

The dreaded "Bee-Killer" of Texas and the Southwest, *Asilus missouriensis*, (fig. 61,) is one of these ferocious robbers. I have noticed that they destroy grasshoppers in great numbers.

Without stopping to consider other families which are somewhat predaceous either as larvæ or pupæ, I will pass to the—

Parasitic Diptera.

The Muscidæ Family.—This large family—containing insects of such varied habits as the common house-fly, whose larvæ or maggots feed on the ordure of the horse-stables; the meat-fly, too well known to every housekeeper; the radish, onion and cabbage flies, the terrible pests of the gardener; the apple-fly, which only needs to become as common to rival the codling moth in mischief; the cheese-fly, so minute that it is even more dreaded than the meat-fly—is not wholly corrupt, for the large group belonging to the old genus *tachina*, but really including several genera, are well nigh the peers of even the *ichneumonidæ*. They resemble the common meat-fly, and are reared in the breeding cage from such insects

as the army-worm, tent caterpillar, Colorado potato beetle, (this being the prey of the *Sydella doryphoræ*, fig. 62,) and grasshoppers, which they of course destroy. It is very common where several of any species of caterpillars are being fed in a cage, to rear both ichneumon flies and these two-winged flies, while from our large silk moths I have reared both from the same larva.

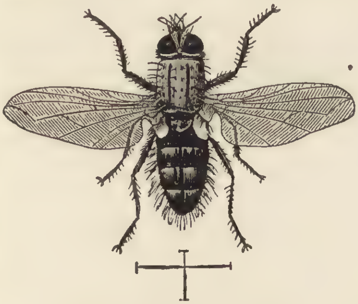


Fig. 62.—*Potato Beetle Parasite.*

COLEOPTERA.—Among beetles there are three families which are very remarkable for their predaceous characters, and are no feeble aids in this insect warfare.

CICINDELIDÆ—TIGER BEETLES.—These fierce, active beetles, *Cicindela vulgaris*, (fig. 63,) with their long necks, pretty form, and often brilliant colors, so commonly seen along sand banks, are insectivorous both as larvæ and imagos, and without doubt take no inconsiderable part in the good work under consideration. The larvæ, like the imago, possess strong jaws, but live in small holes in the ground, though they are usually hidden just at the opening, ready to take captive the unwary cut-worm or grasshopper that dares to brave the tiger in its den.

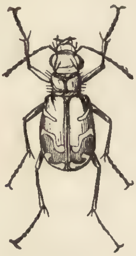


Fig. 63.
Cicindela vulgaris.

Fig. 64.—*Ground Beetle.*

CARABIDÆ—GROUND-BEETLES, (fig. 64.)—This interesting family, from its immensity and habits, takes first rank among predaceous insects. They may be recognized by their long legs, black color, with very few exceptions, narrow head, running, rather than flying habits, (while species of this family do fly into our rooms, yet they generally remain on the ground,) five-jointed tarsi, (a name given to the last joints of the legs,) and serrate, toothed, not beaded, antennæ. These last two characteristics serve easily to distinguish them from the species of another family, *Tenebrionidæ*, which contains the flour-beetle, which they closely resemble.

The grubs (fig. 65) possess six legs, and generally two hooks at the end of the body. These grubs can be kept in confinement and fed on cut-worms, which afford a large share of their food, or other caterpillars.

Few things in nature are more spirited or exciting than to see one of these grubs lay hold of a cut-worm perhaps triple its size and maintain its position with true grit in the general roll and tumble unti. its victim yields the strife, when it satisfies an appetite which its own struggles have done much to create.

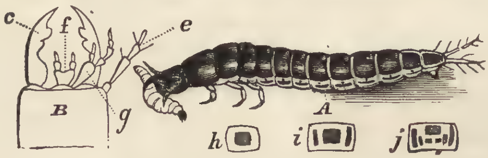


Fig. 65.—*Larva of Ground-Beetle.*

COCCINELLIDÆ—LADY BEETLES.—These beautiful little oval beetles, usually orange or yellow, dotted with black, (fig. 66,) are seldom regarded with that repugnance which is meted out to most insects; in fact it is not uncommon for children to make pets of them, and well do they merit such treatment. Considering the size of the family, they are hardly surpassed in good work. These beetles, especially in the larval state, are very predaceous, and do much to hold our worst insects in check. They not only dine on our potato beetles, but wage relentless warfare on the myriads of plant lice, which, were it not for these lady-beetles, would soon exterminate all vegetation. We see then that even among beetles, the sub-order that gives us our weevils, our worst leaf-eaters, our most destructive borers, and that sleek, old gourmand, the white grub, we find very numerous and important friends, which we should take due pains to encourage.

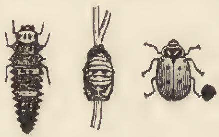


Fig. 66.
Hippodamia convergens.

HEMIPTERA—BUGS.—Beneficial bugs! Who would suppose that relatives of the far-famed chinch-bug, of the squash bug, of bark and plant lice, including the terrible phylloxera—insects which carry wide desolation along with them, often devastating vast areas—could do any good? Yet among insects where we are ever meeting striking contrasts, nothing need astonish us, even to find our best friends the near congeners of insects so noxious and repugnant as to have cast a stigma upon the entire brotherhood.

There are two families of hemipterous insects which contain species that are very predaceous, and do an amount of good not easily to be computed.

REDUVIIDÆ.—The species of this family of half-wings may be known by their long, slim, free head, (fig. 67.) It is difficult to imagine anything more fierce than some of these insects. One species—the wheel-bug—so named from its peculiar thorax, will make lively sport if kept in confinement and fed upon other insects. We soon learn that cowardice is no part of its nature. Some of this family get into beds, that they

Fig. 67.
Reduvius raptatorius.

may rid them of another bug, whose portrait it is not the part of this article to paint. Others feed on such insects as the curculio, potato-beetle, etc.

CORISIÆ.—This family, which contains the ubiquitous squash-bug and the terrible chinch-bug, also contains some very beneficial members. The spined soldier-bug, *Arma spinosa*, (fig. 68,) is a good illustration. This bug, so named because of the spines either side of the thorax, not only depredates upon our insect pests while in the imago stage, but is equally ravenous to suck out their substance while in the larva or pupa stage. It is not uncommon to see it with a potato-beetle, tent caterpillar, army-worm or other insect impaled upon its long beak, while the work of suction is going on. There are a few others of this family with habits like those of the soldier-bug, but for the most part they attack and subsist on vegetables rather than on other insects. The family may be known by the deeply sunken head. Close observation alone can teach us to distinguish quite certainly between friend and foe among them.


a *b*

Fig. 68.—*Arma spinosa.*

ORTHOPTERA—CRICKETS, GRASSHOPPERS, ETC.—The locusts or grasshoppers and their allies—in other words, the orthoptera—are like the lepidoptera, all injurious ; hence, though it might be pleasant to recount the history and habits of the terrible grasshopper of the West, which has brought wide-spread desolation to a large and beautiful portion of our country, yet this sub-order has really no place in this article.

NEUROPTERA—LACE-WINGS.—We come with pleasure to this last sub-order, which stands out as *par excellence* the husbandman's friend. We have seen that two sub-orders are wholly injurious, and four more are greatly dreaded because of certain very noxious members, though in part they are beneficial ; but here among the neuroptera or lace-wings all are our friends, if we except the white ants, which sometimes, though rarely, are troublesome in our greenhouses.

The fine old darning-needles or dragon-flies, often so beautifully tinted, and of such rare grace of motion, are really the eagles among insects. The *Chrysopa* or beautiful lace-wing, than which nothing can be more exquisite, creates havoc among the lice and other evil doers on our cherry and other fruit trees ; while the ant-lion could hardly have had a more fitting name.

It will be remembered that the net-veined wing—all four having such numerous cross veins as to resemble lace—is a character which quickly determines these neuropterous friends.

There are some very curious structural features among these lace-wings, while others have as interesting habits. The larvæ of our dragon-flies have a sort of dipper-shaped mask, which conceals their formidable jaws, but let some incautions insect approach, and quick as shot this is unhinged, and the luckless rover is seen struggling in the very jaws of death.

These larvæ live in the water, which they breathe, but curiously enough we find their gills inside the rectum, and the same water used to oxygenate the blood serves the further purpose of propelling the insect forward, as it is forced out.

The Chrysopa, (fig. 69,) already referred to, places its eggs on the ends of hairs, A, which are attached to the leaves, twigs or fruit. These may be found in July and October, and are very common in cherry and apple trees.

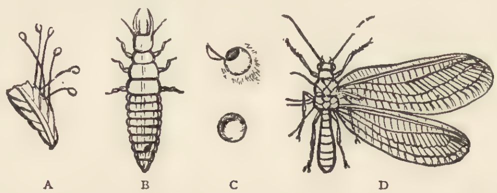


Fig. 69.—*Chrysopa*—A, *eggs;* B, *larva;* C, *pupa;* D, *imago.*

The ant-lion lays a dead-fall by sinking a funnel shaped hole in the loose sand. The savage larva remains buried at the bottom, all except the prodigious jaws. No sooner is the ant-lion made aware, by the falling sand, of the presence of the unwary insect that dares to step on the edge of this pit of death, than there commences such a throwing of sand as is certain to bring the unsuspecting victim to the bottom of the funnel. Once in the jaws of the ant-lion, it is shaken in a manner that would surprise even a rat-terrier.

The neuroptera furnish our largest insects. Here we find the formidable looking Hellgrammite (*Corydalus cornutus.*) This mammoth is wholly insectivorous, and of course to be regarded as a friend.

It is hoped that the preceding descriptions, though so brief, (want of space having precluded detailed descriptions of species,) may not only afford direct aid, but may also awaken an interest which shall lead others to study and observe, that all may learn to distinguish the evil from the good. The awakening of a general interest in such studies, will not only be attended with vast economic benefits, but with a refining and elevating influence hard to be over-valued. What a noble improvement would be inaugurated were all our people, especially the young, induced by proper training to forsake the saloons and other haunts of the vicious in search for entertainment, to experience those richest pleasures which ever follow the study of nature !

CABBAGE GRUBS.—A correspondent of the COUNTRY GENTLEMAN has destroyed white grubs at the roots of cabbages by the following method: Loosen the earth close to the root with a hoe, even so much as to disturb the plant. Make a solution of one part of soft soap to twelve of soft water, and pour about the root in close contact with the plant. One-fourth of a pint of this solution to a plant two or three times during the season is sufficient. Weaker suds poured on the top would destroy the green worm.

SWEET POTATO CULTURE.

By Samuel L. Allen of Cinnaminson, New-Jersey.

A SANDY SOIL is of the first importance in growing sweet potatoes, either for a large crop or for good quality. Even a poor blowing sand is well adapted to their culture, and with proper management will yield a large and profitable crop.

It is quite usual to grow sweet potatoes continuously in the same place, though many consider it best to change. The ground should be plowed shallow, as it favors the growth of short, well shaped tubers. Mark out from 7 to 7½ feet apart with a one-horse plow, cleaning out by returning in the same furrow. The manure should be short and evenly distributed along the furrows at the rate of a large one-horse cart load to 200 yards of row. Cover with a heavy ridge directly over the manure; then open another furrow between those first made, manuring and covering in the same manner, thus making the ridges 3½ or 3¾ feet apart. This plan avoids the filling of the rows by the cartwheels before manuring. In case of extremely dry weather about the time of "making up" the ground, it is advisable to cover the manure only partially, and upon the coming of rain to finish the ridges. Many good farmers prefer marking out the ground 3 feet apart each way, placing the manure at the crossing, and then covering with a good sized hill. Drill culture allows closer planting, makes less trouble to prepare the ground, and gives chances of a larger crop, while hill culture has the advantages of taking less manure and less hand labor, and is probably the best for *extensive* field culture.

The potatoes usually selected for seed are of short, compact shape, rather below medium in size, and in this latitude are "sprouted" in hot-beds, and the sprouts, when well rooted, set in the field. A mild hot-bed should be made for them about the 10th of 4th mo. (April.) The bed should run east and west. Dig a trench 12 or 15 inches in depth, 6 feet wide, and of any desired length. A bed 100 feet long is large enough for about 35 bushels of seed, which should yield at first pulling 60,000 plants, and ten days later 30,000 more. Board up the south side of the trench about 18 inches high; the other, 3 feet. Manure for the bed should be thrown into a compact heap ten days before needed, being turned once or twice in the interval, to insure an even commencement of heating, and it should be of such a character as to be sure to heat, but not too violently. A good proportion is two-thirds good fresh horse and one-third cow stable manure. It should be placed evenly in the bed to the depth of 12 or 14 inches, upon a layer of 2 inches of coarser manure, and being neatly leveled with a fork, and finished by pressing down with a wide board or door, it must be covered with 3 inches of sandy soil, upon which the seed potatoes are to be

placed evenly, about half an inch apart, and *settled* to one-half their thickness; then sprinkle with water and cover with 3 inches more of sand. The whole must then be covered with a coating of coarse hay, two feet deep, or sufficient to protect the bed from any change of temperature, and boards must be provided to keep off rain, supported by temporary rafters, which are taken off out of the way in good weather; on these the boards, a foot wide, are laid, beginning at the bottom and overlapping.

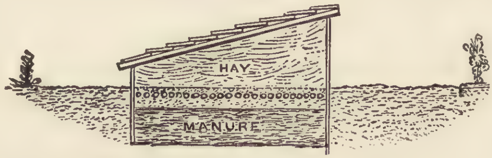


Fig. 70.—*Bed* 6 *feet wide—Manure* 1 *foot to* 14 *inches when settled. Roof, boards on rafters overlapping. Potatoes in sand.*

Careful watching is necessary for the first ten days. Examine thoroughly all parts of the bed every day or two by thrusting the finger into the sand between the potatoes below their level. It should feel decidedly warm, and as long as an even warmth at this point can be maintained through the first ten days, the bed needs no farther attention. But it almost always happens that some parts will become too hot and others too cold in three or four days. The former places must be thinly covered during the night; the latter should have all the hot mid-day sun possible, and be covered up warm, and every effort made to increase the heat. In cases of extreme heat, water thoroughly, and with a crowbar work a double row of 3-inch holes, one foot apart, along the centre of the bed, through the manure. This will have the desired effect in a few hours.

About ten days after "putting out," the bed should show white crowns of the plants pushing vigorously through all parts of the surface, and will thenceforth need uncovering during all good days from 9 to 4 o'clock, increasing the length of time and decreasing cover as the plants strengthen, till just before setting out time, when they should be left uncovered at night also, to "harden." The bed will need frequent watering, done with least risk about 2 P. M.

All this care is requisite, and though troublesome to the inexperienced, resolves itself into a plain, straightforward duty with practice, though always ready to result in partial failure with the slightest cause.

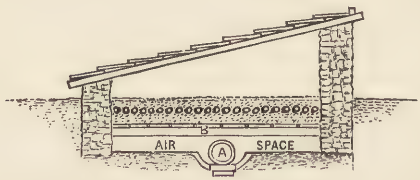


Fig. 71.—*Bed* 10 *feet wide, heated by flue*—A, *flue in trench—Air space beneath floor* B *supporting sand, which contains sprouting tubers.*

A new and more economical plan, (fig. 71,) though expensive at first, is to substitute furnace heat in a "smoke flue" for manure. An 8-inch pipe,

or brick flue of larger capacity, should be placed in a trench in the centre of the bed, running lengthwise, the furnace and chimney at extreme ends. A board floor should be placed 8 or 10 inches above the flue, and covered with 6 inches of earth, upon which the potatoes are to be placed and covered with 3 inches more. No hay is required. I have just made one out of an old bed 90 feet long, by 8 feet wide; a partial trial promises success and economy. A width of 10 or 12 feet is advisable in building a new bed.

Plants should be ready in five weeks; should be stocky and have plenty of fibrous roots (fig. 72.) "Pulling" is done, one sprout at a time, by a *side draw*, which detaches the plant without disturbing the potato, important in consideration of the "second pulling."

Fig. 72. *Young Plant.*

Fig. 73.—*Grubbing-Hoe for Planting.*

The ridges for setting out should be made up some days, or even a fortnight, before needed. In this latitude the plants may be set at any time between the middle of the 5th and 6th mos., (May and June,) though the earlier the better, excepting in occasional seasons of continued wet and cold weather. The plants should be set 18 inches apart, generally done with a miniature grubbing hoe, (fig. 73,) blade 6 inches long by 3 inches wide, handle 12 inches long. The blade must nearly describe a portion of a circle whose axis passes at right angles through the handle 2 inches from the end. A new planting machine, with which the operator stands erect, is now coming into use, and giving fair satisfaction.

It is best to remove the dry top of ridge with a light scraper drawn by a horse, (fig. 74,) wide enough to do two rows at once, but only done as fast as needed by the workmen. I attach a rolling marker, a considerable convenience. It should level the ridges to 8 or 10 inches in width. This destroys the first crop of weeds, leaves the damp earth just right for setting out, and the work is done better and with greater rapidity. In constructing this machine, the forward edges of the boards must be an inch or two higher than the rear. The rollers are attached to the front board by means of long irons fastened to staples, and passing through high staples in the rear board, high enough to give 3 inches play, or the roller will lift the leveler. These irons bend up at the rear, and hold a cross-piece for a handle,

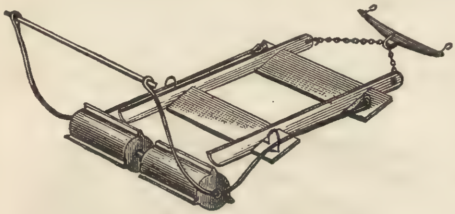


Fig. 74.—*Scraper and Marker.*

and they must be good and stiff. Two or three longitudinal strips are to be fastened to the rollers for marking. With a roller 16 inches in diameter three strips will mark 18 or 19 inches apart, two strips about 26 inches, the small size of the roller and the high markers jumping the ground a little and marking at greater than calculated distances.

First cultivation should be done just before the weeds appear above ground, with a one-horse Thomas smoothing harrow, "a round" to a row; in some cases it is best to remove *one* tooth, to allow the remainder to straddle the row at that point. The next tending should be with a broad toothed cultivator, aud the next also, about ten days apart, *one* of them accompanied by careful hoeing. By the time ot the last cultivation it is generally necessary to turn the vines out of the way, (fig. 75,) working every other middle, then turning back and finishing, fig. 76. ("Middles" are "balks" or the spaces left unplowed after throwing one furrow to each row.) When the vines begin to meet between the rows pretty generally, they are ready to be "laid by"—that is, turned and tended for the last time. They should then be thoroughly turned by throwing the vines of two rows together, (fig. 77,) plowed from, and scraped to clear away the weeds from the surface with the hand hoe; plowed to, and the middles plowed out, a laborious operation if not done at the time mentioned.

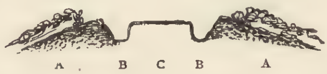


Fig. 75.—*Section of rows*—A A, *Potato plants;* B B, *first furrow;* C, *middle.*


Fig. 76.—*Section of first side finished.*

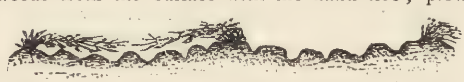


Fig. 77.—*Completely finished—two furrows to back plow, filling up whole rows.*

The principal disease is the *black rot.* It is easily detected in the bed, plants rotting off from the potato, or showing an occasional sprout with *black* spots on the otherwise *white* stem and roots. It is capricious, depending somewhat upon the weather, and other causes. This disease should be scrupulously avoided. In pulling plants, the finding of three in a hundred affected with it would condemn them, if possible to obtain others. Potatoes grown from affected seed have black blotches in the skin, easily detected.

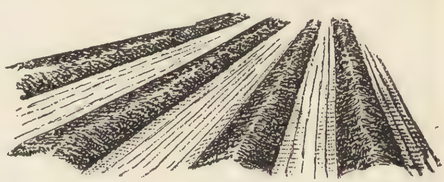


Fig. 78.—*View of rows after turning two and two together.*

Ants often undermine plants badly; the remedy is hoeing. The striped bug often destroys one side or corner of a field; air slaked lime is

advantageous. "Peddlers" are increasingly destructive. I had three acres reduced one-half in yield by them the past season. This is a small, whitish yellow, mealy insect, working *entirely upon the under side* of the leaves, riddling them and sapping the strength. Possibly turning the vines while covered with dew, and dusting with Paris green, would rout them, though they are most injurious while plants are small. This name was probably given to them from their tails' gradually growing up over their backs, and resembling a peddler's pack, of a dark brown color, contrasting strongly with their butter-colored body.

The main crop is usually dug after frost has blackened the vines; cutting off the vines, plowing out, and "shaking off" three rows together. For market the potatoes are then "rubbed off," and put up in baskets, in two sizes. For winter sales they are picked up without rubbing off and poured into large bins in a house or cellar, with a constant fire, especially during the sweating period; the best temperature is about 60°.

The most approved sweet-potato house is now built of stone, one-half under and one-half above ground, though banked to the eaves, with an entry through the centre, in which the stove is placed. The bins are

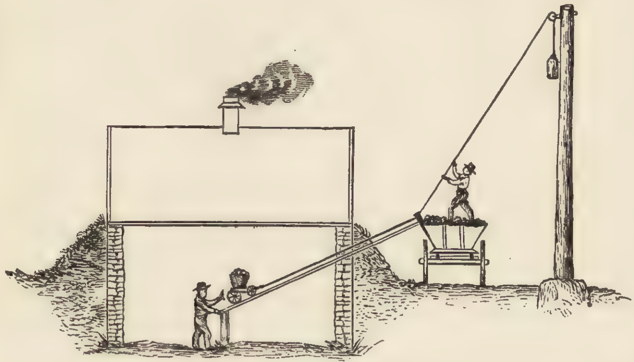


Fig. 79.—*Sweet Potato House.*

from 6 to 8 feet square, and 8 to 12 feet deep. A railroad and car for one basket, with adjustable platform, and balancing weight and rope running over a pulley at the top of a 20-foot pole, makes the filling easy.

I give a sketch or section of my potato house, fig. 79. The *weight* on the inclined railway entering it is increased or diminished, so as to overbalance the car containing the empty basket, and be less than the car with a full one; then a slight assistance from the man on the wagon will make it work like a charm, the two men unloading 72 baskets in 15 minutes, to any part of the cellar. The house is 16 by 18 feet inside, with 10 feet walls, 5 feet of which are above the level of the ground, but banked

to the eaves. There is a glass door on the south, with window above; a movable sill to give room for the railroad track, and double windows at the other end. It holds nicely 3,000 bushels; when full, 3,500 bushels. It is plastered from the wall up to the peak, lathing on the under side of the rafters.

Sweet potatoes should be cooked by steaming, and when *barely* done through, should be skinned, halved and slightly browned in the oven upon the grate.

The varieties of the sweet potato, although numerous, have but little prominence here, the chief effort being to get good, reliable seed, free from black rot, which generally has no special name or reputation beyond the neighborhood of a successful grower. The Early York and Nansemond are probably the sorts most planted here.

FOREST TREES AND HOW TO RAISE THEM.

IN THE FOURTH VOLUME OF RURAL AFFAIRS, page 256, we gave some general directions for the raising and cultivation of timber and forest trees, and pointed out the importance of more attention to this subject than has yet been generally given to it. We now propose to describe the different trees more in detail, their value, and the several modes for their management and culture, and also to include a number which are particularly to be recommended as ornamental and shade trees. At the present rate of destruction of our original forests, the time will soon arrive when artificial plantations of trees must be made to supply the demand which will always exist for the various building and manufacturing purposes. Land owners who commence ere long to cover a portion of their lands with valuable young wood, will be likely to secure, in time, ample remuneration by the increasing value of the timber. The frequent complaints which we receive of failure in attempts to raise trees from the seed, show the importance of a greater degree of practical knowledge on the subject.

The Oaks.

As majestic ornamental trees, and as especially valuable for timber, many species of the oak stand pre-eminent among the forest trees of temperate climates. Out of more than a hundred distinct species, (as well as many varieties,) about forty grow in the United States. A few are small trees or shrubs; most of them are stately trees. They are raised from the seed or acorns, which should be gathered as soon as they ripen and fall, and before the horny coating becomes dry. Like the chestnut, they will not germinate after this coat is hardened by losing its moisture. They should therefore be at once mixed with slightly moist sand, to prevent

fermentation and to preserve their vitality. They may be planted in autumn, if there is no danger from mice; otherwise very early in spring. As the trees do not transplant easily, they succeed best when planted where they are to remain, if large plantations are intended. They should be kept well cultivated for a few years, and a convenient and economical way is to plant corn, potatoes or beans between the rows of young trees.

The Most Desirable Species.—For economic value, the WHITE OAK (*Quercus alba*), fig. 80, stands conspicuous. Its timber is famed for its strength, compactness and durability. In many portions of the country, forests of large trees are disappearing rapidly before the axe, and the timber is becoming scarce and high priced. Although a slow grower, the trees attain large size. It is distinguished by its smooth, light-colored leaves, pale beneath, and cut into from three to nine rounded lobes (fig. 81.) The Wadsworth oak, near Geneseo, N. Y., with a trunk over eleven feet in diameter, is one of the finest specimens of this species.

Fig. 80.—*White Oak.*

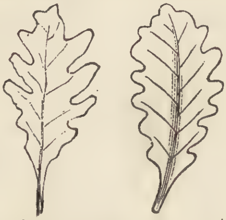


Fig. 81.—*White Oak Leaves.*

The famous British oaks, (*Q. robur*, vars. *pedunculata* and *sessiflora*,) fig. 82, closely resemble the white oak.

CHESTNUT OAK (*Q. prinus*) fig. 83.—This species grows mostly on low grounds, where it is known by the name of Swamp Chestnut oak, and is most abundant in the Middle States and southward. It forms a large and handsome tree. Its timber is of medium quality. The variety known as Rock Chestnut oak (*Q. prinus* var. *monticola*) is found on the Alleghanies and other mountains, the wood of which is very heavy, sinking in water, and possessing much durability. The leaves resemble those of the chestnut.

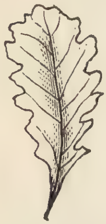


Fig. 82.—*British Oak.*

Fig. 83.—*Chestnut Oak.*

SWAMP WHITE OAK, (*Quercus bicolor*,) is a tall tree, growing on low grounds, and grows farther to the north than the preceding, and furnishes timber of excellent quality, or next to that of the White oak. The leaves are more deeply lobed than those of the Chestnut oak. The cup of the acron is often mossy-fringed at the margin.

SCARLET OAK, (*Q. coccinea*,) is a large tree, growing on dry soil; the

bark is gray outside and reddish within; the leaves are on long, slender footstalks, and are deeply lobed, (fig. 84.) They turn to a bright red in autumn. The wood is not valuable for fuel or timber, and this species is not recommended for plantations.

Fig. 84.—*Scarlet Oak.*

Fig. 85.—*Black or Dyer's Oak.*

BLACK OAK, (*Q. tinctoria,*) fig. 85, is found in many parts of the United States, and is one of the largest and loftiest of the oak family. The writer has measured the trunk of one in Cayuga County, N. Y., fully six feet in diameter. It is better adapted to poor soils than most other species. The wood is rather coarse, but is much used for timber, and possesses medium durability. Some botanists regard this as only a variety of the scarlet oak. The chief points of difference are the darker colored bark of the Black oak, which is thicker, rougher, and orange-colored instead of red within, and the acorns have a yellowish flesh, instead of white as in the Scarlet oak. The bark is used in tanning, and the wood is good fuel.

POST OAK, (*Q. obtusiloba,*) known also as Rough or Box White oak, is a small tree, growing mostly on dry and poor soils, furnishing the most durable wood of any of the species. It is yellow, strong, fine grained, and consequently sought for posts, wagon wheels, &c. It has thick leaves, which are grayish and downy beneath, pale and rough above. Although rarely over forty or fifty feet high, and twelve to eighteen inches in diameter, its durability renders it worthy of a place in timber plantations. A fine tree of this species in Mamaroneck, N. Y., measures upwards of ninety feet across the spread of its branches, but this size is unusual.

BURR OAK, Overcup or Mossy-cup White oak, (*Q. macrocarpa,*) is a middle-sized, or rather large, handsome tree, most common in the Western States, distinguished for its large leaves and its large acorn in a scaly and fringed cup, which nearly covers it. It is most commonly found in rich soils. Its timber is quite porous, but is very durable, and is well adapted for agricultural machinery and for posts.

Fig. 86.—*Red Oak.*

RED OAK, (*Q. rubra,*) fig. 86, is well known throughout the country; is common in rich and poor soils; is rather a rapid grower, and becomes a large, handsome tree. The wood is quite coarse, and reddish in color; is not very durable, and is regarded as rather poor in quality.

PIN OAK, (*Q. palustris,*) fig. 87, also known as Swamp Spanish oak,

grows on low grounds, only at the North, and forms a handsome, medium-sized tree. It has a coarse, tough, but not very durable wood, and its chief value is for ornament.

Fig. 87.—*Pin Oak.*

Fig. 88.—*Black Jack.*

Black Jack, (*Q. nigra,*) fig. 88, is a low tree, growing mostly in poor soils or barrens, and hence called also Barren oak. Its chief value is for fuel, for which it is much esteemed. The wedge-shaped leaves are widely dilated, mostly three lobed, rounded at base, and rusty-downy beneath.

The Live Oak, (*Q. virens,*) a fine evergreen species, is too tender except in the southern portion of the Union, where it sometimes reaches magnificent dimensions. The wood is heavy and compact, and exceedingly durable.

The Cork Oak, (*Q. suber,*) like the live oak, is evergreen, and has been recommended for cultivation in the Southern States.

The Chestnut.

The American chestnut (*Castanea vesca,* var. *Americana*) grows on dry lands and rocky hillsides from Maine to Michigan and Kentucky, but not west of the Mississippi. It is one of the most magnificent of all our native trees, resembling the oaks, but more rapid in growth than any of them. It forms a round-headed, spreading tree, and will attain great size. Many are on record which have been seven or eight feet in diameter, and the spread of the branches has been eighty or ninety feet. The wood, although coarse-grained, is strong, elastic and durable, and is much used in the manufacture of furniture. It is also much employed for posts and rails, for which its durability renders it particularly valuable. When the trees are cut in winter or in early spring, the stumps send up suckers freely, and the plan-

Fig. 89.—*Chestnut.*

tation is thus renewed with little attention or care. Young trees are easily raised from seed, if the nuts are never allowed to become dry. They should be mixed at once with moist sand, placed on the ground, and protected with a thick mulch until planted, which should be done early in spring, about an inch and a half deep. They do not transplant well, and for this reason the young trees should be either removed when quite small, or the nuts planted where the trees are to remain. If planted in rows with corn or other hoed crops, and subjected to clean cultivation, they will make a rapid growth.

The Beeches.

The beech (*Fagus*) is one of the finest of large ornamental trees, and the wood is valuable for certain manufactured articles. The American species (*Fagus ferruginea*) becomes a large tree, and is common in the Northern States, extending southward along the Alleghanies. There are two varieties running into each other, the white and the red beech, the former having more sap wood, which quickly decays when exposed to the weather; the red heart-wood of the latter making timber of great durability. The European species (*F. sylvatica*) is distinguished by its broader and shorter, firmer and more hairy leaves, and it furnishes a curious and interesting variety in the Weeping beech, remarkable for the eccentric and trailing contortions of its branches. There are several other varieties, among which are the purple, copper-leaved, variegated, and the cut-leaved beeches.

Fig. 90.—*Hop Hornbeam or Iron Wood.*

The beech is easily raised from seed, the same care and management being required as for the chestnut. It is not to be recommended as so profitable a tree for timber plantations as some others.

Hop Hornbeam

or Iron Wood, (*Ostrya virginica*,) is a small tree, growing thirty or forty feet high, in rich woods, and having a hard, tough wood, which is manufactured into mallets and small tools. Its long-oval, hop-like fruit ripens seed the latter part of summer.

The Birches.

There are six sorts that are worthy of notice, the Black, Yellow, Red, American White, European White, and Canoe Birch. They are mostly adapted to the Northern States.

Black, Sweet, or Cherry Birch, (*Betula lenta*,) growing in moist woods in the Northern States, is a rather large tree, with fine-grained and valuable wood. The bark is dark brown, and unlike some other species, does not peel off in thin layers. The twigs are a reddish bronze, and very aromatic. The leaves are oblong-ovate, and somewhat heart-shaped, and sharply and double-serrate. The trees often attain a height of sixty or seventy feet, with a diameter of two or three feet. The seeds ripen late in autumn, and when gathered should be mixed with slightly damp, clear sand till spring, and then sown in beds of fine light soil, with a very shallow covering, the surface being slightly shaded and kept moist with a thin covering of moss or other similar substance.

Yellow Birch, (*B. lutea*,) is nearly as large a tree as the preceding, and grows in a handsome, straight form. The twigs are less aromatic than those of the preceeding species. It flourishes in cool, moist lands at the North. The wood, although valuable, is less esteemed than that of the Black birch. The seeds ripen at mid-autumn, and are to be treated as already described.

European White Birch, (*B. alba*,) is cultivated for ornament, and several beautiful varieties have sprung from it, which are scarcely equalled among all trees for the lightness, grace and delicacy of their growth. The *European Weeping Birch* is an old variety, which grows rapidly, and reaches a height of thirty or forty feet in twelve or fifteen years. The *Cut-leaved Weeping Birch* is a tree of surpassing grace and beauty.

The American White Birch, (*B. alba*, var. *populifolia*,) is a small tree, growing on poor soils near the coast, from Maine to Pennsylvania, slender and graceful in growth, with a chalky white bark ; the long pointed leaves are tremulous like those of the aspen. It is a handsome ornamental tree, but the wood is of little value. The bark separates into layers less freely than the Paper birch.

Paper or Canoe Birch, (*B. papyracea.*)—This is a large tree, with fine-grained wood, the very tough, durable, silvery-white bark splitting into thin, broad, paper-like layers. The leaves are dark green above, pale beneath. It is confined to the North, growing in woods from Maine to Wisconsin. It often reaches 70 feet high, and 3 feet in diameter. The bark has been used by the Indians in the construction of light canoes. It is a beautiful ornamental tree, and furnishes good fire-wood. It will flourish in moist soils.

Red or River Birch, (*B. nigra*,) is found on the banks of rivers from Massachusetts to Illinois, and southward. It is a rather large tree, often 70 feet high, with reddish brown bark, and compact, light-colored wood. The specific name *rubra*, given by Michaux, would therefore be more appropriate, especially as the Black birch (*B. lenta*) is much darker than this. The seeds ripen early in summer, and should be sown at once, the young plants being shaded from the sun.

The Walnuts.

Black Walnut, (*Juglans nigra,*) fig. 91, is one of our finest large ornamental trees, and one of the most valuable for its timber, which is especially esteemed for cabinet work, and for the inside finish of houses. It is found growing throughout the country, and is most abundant in the valley of the Mississippi. It has become scarce in many places, in consequence of the heavy demand for its timber, and new plantations should be made by land-owners who have extensive tracts of fertile soil. It is easily raised and grows rapidly. To keep the nuts from becoming too dry before they germinate, the easiest way is to place them in small heaps on the ground, and cover them with litter or turf, till the following spring, when they are to be planted. If in rows from four to six feet apart each way, they may be cultivated for a few years while young; or they may alternate with hills of corn. The trees should be kept growing rather thickly, to cause them to run up straight, as their natural tendency is to branch and spread. As they become large, the intermediate trees may be thinned out and used. The Black walnut is an exhausting tree to the soil, and plantations should be made by themselves, and not near orchards or other trees.

Fig. 91.—*Black Walnut.*

Butternut, (*Juglans cinerea,*) differs from the black walnut in a less size of the tree, in its clammy, downy stalks and shoots, and in its oblong nut. The wood resembles that of the the Black walnut, but is less compact, and not so valuable, although much used. It is easily raised from seed in the same way as that just described for the black walnut, and the trees grow rapidly.

English Walnut, (*Juglans regia,*) fig. 92, is not hardy enough for general cultivation at the North, where the spring frosts often destroy the blossoms, and hence it bears fruit very sparingly even in the middle States.

Fig. 92.—*English Walnut.*

The Hickories.

The several species of *Carya*, which are all North American trees, are valuable for timber, and some of them for nuts. They have very hard, elastic and tough wood, which, however, quickly decays when exposed to the weather. It is regarded as the best wood for fuel, producing a strong and continued heat. The young trees are valuable for hoops.

Shellbark Hickory, (*Carya alba.*)—This is distinguished by the shaggy bark on old trees, which separates in rough, horny strips. It grows 70 or 80 feet high, with a tall, slender trunk. It bears a sweet and excellent nut, some trees producing much larger ones than others, with different degrees of thickness to the shell. It is probable that by the selection and propagation successively from the largest, thinnest shelled and most productive sorts, a great improvement might be made both in the excellence of the nuts and in the prolific character of the trees.

Western Shellbark, (*C. sulcata,*) differs from the preceding in its lighter colored heart-wood, in the more numerous and more downy leaflets, and in the larger, yellowish or dull white nut, with a very thick husk. The nut is mostly pointed at both ends. The tree has the same shaggy bark as the common Shellbark.

Mocker Nut or White Heart Hickory, (*C. tomentosa,*) has a rough bark, not splitting off in strips; the shoots are woolly, as well as the lower sides of the leaves when young. The fruit has a very thick, hard husk and globular nut, thick shelled, and hardly fit to eat. The tree grows 50 or 60 feet high, and the wood is excellent on account of its strength and toughness, and its value as fuel. It is so slow in growth as not to be recommended for timber plantations.

Pig-nut or Broom Hickory (*C. glabra* or *porcina.*)—This becomes a large tree, sometimes 80 feet high, and 3 feet in diameter. The shoots and leaves are nearly smooth; the nut sweet at first, then bitterish. The wood is very strong and tough, and is preferred for axletrees and axe-handles. The nuts are only eaten by swine and other animals.

Bitter-nut, (*C. amara,*) has a smooth bark, and a larger number of leaflets than several other species; the fruit is white, thin-shelled, becoming very bitter. The wood is less valuable than most other species, and the tree is not to be recommended for plantations.

Pecan-nut, (*C. olivæformis,*) grows along rivers in the Western States. The tree resembles the Bitternut hickory; the leaflets numerous; the nut olive-shaped, thin-shelled and delicious. The tree grows 60 or 70 feet high, and has a fine ornamental appearance. The timber is only medium in quality, but the excellence of the nuts renders it worthy of cultivation.

All the species require similar treatment for propagation. The nuts, when gathered, should not be allowed to become dry, but should be mixed with sand and placed in heaps on the ground, covering them till the following spring with a thick mulching or with inverted turf several inches in thickness. They are planted early in spring, about two inches deep. On account of their large tap-roots, the trees are difficult to transplant, and they should therefore be either transplanted when very young, or the nuts planted where the trees are to remain. By cutting off the tap-root at a proper depth, while the trees are in a dormant state, the roots may be improved for transplanting a year or two following.

The Poplars.

There are several well-known species of the Poplar, (*Populus*,) of greater or less value.

The Abele or White Poplar, (*P. alba*,) is introduced from Europe, and has been much planted as an ornamental tree, being a very rapid grower, and forming a dense round head of foliage, which presents a beautiful and striking appearance, as its myriads of silvery leaves are rolled in the wind. A strong objection is the profusion of suckers which it sends up as far as its roots extend; but if these are repeatedly grubbed while in leaf, they will cease to come up.

Lombardy Poplar, (*P. dilatata*,) is a well-known spiry grower, formerly much planted as an ornamental tree, but now sparingly introduced for variety in plantations. The wood is very light, and is of little value either for fuel or for other purposes.

Cottonwood, (*P. monilifera*,) grows along the great lakes and rivers from the Eastern States to the West and South, and is a large tree, 80 feet or more in height. Its wood is of little value.

Fig. 93.—*Carolina Poplar.*

Angled Cottonwood, (*P. angulata*,) fig. 93, resembles the preceding, but is distinguished by its sharp angular branches, the *monilifera* having slightly angled branches, becoming round.

American Aspen, (*P. tremuloides*,) is a small, handsome tree, only planted for ornament.

There are several other species, not of much value for their wood or timber. Nearly all grow readily from cuttings, by which they are usually propagated.

The Maples.

The Sugar Maple, (*Acer saccharinum*,) fig. 94.—This large tree, which is most abundant in the Northern States, is especially valuable for its timber and for the sugar of its sap. It often grows 80 feet high, with a diameter of 2 feet, but it is occasionally larger. The wood is hard, heavy and strong, but not durable when exposed to alternations of moisture. It forms a valuable fuel, and on account of the high polish which it receives is much used in cabinet work; the Curled and Bird's Eye varieties being much sought for ornamental purposes. The seeds ripen in autumn, at which time they may be either sown or kept till early spring in slightly damp (not wet) sand. They should be planted in a fine, mellow,

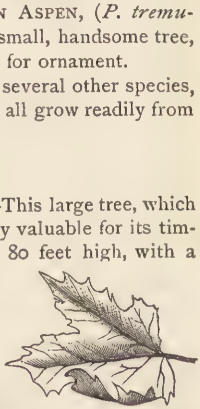


Fig. 94.—*Sugar Maple.*

dry soil, about an inch deep, in drills, and the earth pressed upon them after covering. The young trees are easily removed to plantations, which should always be on upland with a natural drainage. Their growth when young is not so rapid as some of the other species. The Sugar maple is a fine ornamental tree, and is particularly valuable for planting in wide streets.

BLACK MAPLE, (*Acer nigrum*,) fig. 95, is now mostly regarded as only a distinct variety of the Sugar maple, but from some of its peculiar characteristics, Michaux was probably correct in regarding it as a distinct species. The drooping lobes of its broad leaves give the tree a peculiar and rich appearance, and its clear green color, and the more or less pubescence of their under surface, are quite unlike the smooth and whitish surface of the common Sugar maple. The leaves are much larger than those of the Sugar maple, often measuring 9 inches in breadth. Its timber is like that of the Sugar maple, and it is propagated in the same way. It is especially to be recommended as an ornamental and shade tree.

Fig. 95.—*Black Maple.*

ASH-LEAVED MAPLE, (*Acer negundo*,) is a handsome, symmetrical, rather small tree, with light green twigs and drooping clusters of small, greenish flowers, which appear rather before the leaves in spring. In rich soils its growth is very rapid, and it is desirable when an early growth of shade trees is an object. The seed ripens in the fall, and should be treated for planting like that of the Sugar maple. It is separated by some botanists from the Acers and made into the genus *Negundo*.

NORWAY MAPLE, (*Acer platanoides*,) fig. 96, is a handsome, round-headed tree, with thin, broad, smooth leaves, bright green on both sides, which hold green later than most maples. It is a native of Europe and is introduced and cultivated in this country. It is propagated from the seed like the sugar maple; the young trees grow slowly at first, but more rapidly afterwards. Its timber is not equal to that of the Sugar maple.

Fig. 96.—*Norway Maple.*

SYCAMORE MAPLE, (*A. pseudo-platanus*,) fig. 97, also a native of Europe, is a handsome spreading tree, differing from the preceeding in its leaves which are whitish and slightly downy beneath. It has been much planted as an ornamental tree, but the trees when young

Fig. 97.—*Sycamore Maple.*

are liable to have the twigs winter-killed at the North. The seed ripens in autumn, and for planting are to be treated as already described.

SILVER MAPLE, (*Acer dasycarpum*,) is a handsome ornamental tree, much planted along streets; the branches are spreading and drooping, the leaves silvery white beneath. It is found on river banks throughout the Union, and trees have grown in some instances over four feet in diameter. The wood is fine-grained, but not durable. It makes good fuel, and is manufactured into various articles. The seeds, unlike those of the Sugar and Black maples, ripen early in the season, and if gathered, may be at once planted an inch deep in drills. The young plants will appear in a week or two. A slight shading from the hot sun is generally required for them in the early stages of their growth. They grow twice as rapidly as the Sugar maple when young.

RED OR SOFT MAPLE, (*Acer rubrum*,) fig. 98.—This resembles the Silver maple, (which is sometimes called also Soft maple,) but it is readily distinguished by its reddish tinge, and its scarlet or crimson flowers, those of the Silver maple being green. It is a smaller tree, and grows with much vigor. The seeds are an inch or less in length, and are often reddish; the seeds of the Silver maple are over two inches long, including the wings. The seeds of the Red maple are a little later in ripening, and for sowing should be treated in the same way. In autumn the leaves change to different shades of red. The wood is much used for various manufactured articles.

Fig. 98.—*Red Maple.*

Fig. 99.—*Striped Maple.*

STRIPED MAPLE OR MOOSE-WOOD (*Acer striatum* or *pennsylvanicum*,) fig. 99, known also as Striped Dogwood, is a small tree, common at the North, with light green bark, striped with darker lines. It has heavy, dense leaves, which are sharply serrate. The wood, although durable, is too small for common use. It is a handsome ornamental tree. and is raised from seed as already described.

MOUNTAIN MAPLE, (*A. spicatum*,) is a tall shrub, common in the Northern States, the flowers in upright, dense racemes, the latest flowering species. It is planted only for ornament.

ENGLISH HEDGE MAPLE, (*A. campestris*,) introduced and cultivated in this country, forms a handsome, compact, bee-hive shaped tree, ten or twelve feet high. It should not be pruned, but allowed its foliage down to the ground, and thus it becomes a handsome ornament to the lawn.

There are two Californian species that are beginning to be planted at the East, the ROUND-LEAVED or VINE MAPLE, (*A. circinatum*,) a tall spreading shrub, with small corymbs of purplish flowers; and the LARGE-LEAVED MAPLE, (*A. macrophyllum*,) a small timber tree, with thick leaves sometimes a foot wide. The young trees are tender.

The Elms.

American or White Elm, (*Ulmus Americana,*) is one of the largest of our deciduous trees, and when well grown, scarcely equaled for its graceful and majestic form. It forms a magnificent shade tree. It succeeds well as a street tree, and when its branches meet over avenues, it reminds the spectator of the interior of gothic cathedrals. The wood is employed for many purposes in the manufacture of wooden articles, but warps badly when cut into plank and boards. It is easily raised from seed, and grows rapidly. The seeds ripen early, and should be sown at once, the young trees growing several inches the same season.

Corky or Thomas' Elm, (*Ulmus racemosa,*) is less in size than the preceding, and more rigid in growth, and it is distinguished by the corky excrescences or ridges on the young branches. The wood is finer grained than the American elm. It is propagated in the same way.

The Wahoo Elm, (*U. alata,*) resembles the preceeding in its corky branches, but is smaller in size, and chiefly confined to the Southern States.

Slippery or Red Elm, (*U. fulva,*) is a tree of medium size, with rich green foliage, but less symmetrical in form than the American elm. Its wood is much more valuable, stronger, warps less, and is more durable.

Scotch or Witch Elm, (*U. montana,*) is a large, handsome tree, introduced from Europe.

English Elm, (*U. campestris,*) has smaller leaves than our elms, and the leaves and bark are darker colored. The branches are peculiar in their straight, diverging and spreading form. It forms a fine shade tree, and will grow to a great size. In Gloucestershire, England, a tree stood which measured 149 feet across its branches, and the trunk was 7 feet in diameter. Another, in Warwickshire, was 200 years old, 150 feet high, with 74 feet spread of branches.

The Osage Orange.

The Osage Orange has been extensively planted for hedges ; and when the soil has been upland, and has had a complete natural or artificial drainage, the trees have sufficiently endured the winters in the North. Where the growth is rapid and succulent, the frost cuts them back, and for this reason they succeed best on soils of moderate fertility, with such cultivation as favors the ripening of the wood before cold weather. There are some other essentials for successful hedges, among which are the selection of even sized, healthy plants ; careful setting out, so that all may grow and leave no gaps ; a good mellow bed of soil to plant them in ; free cutting back early in spring, a year or two after they become well established, and clean cultivation for some years, or until the hedge becomes a barrier.

Many fail with the seed. This failure is sometimes owing to their bad quality, either because too old, or else from fermentation in the pomace. The best way to avoid this loss is to purchase of reliable men. The seed will sprout earlier and more freely if they have been frozen in winter, and

such seed will therefore require very early attention. The best way is to soak them in water, frequently changed, for ten days before freezing, and not allow them to thaw till near planting time. For this purpose purchase the seed before spring. If obtained late, soak several days, or else use warm water, changing it frequently. Success, however, is much less certain with late planted seed, and a large portion, sometimes three-fourths, fails to grow.

Sow in drills with the seed half an inch apart, about an inch deep. If early in spring, half an inch will be better; if quite late, when the soil is becoming dry, nearly two inches will be necessary. Especially avoid weedy or grassy soil, let it be fine, clean and mellow. Keep the seed beds constantly clean. There are about 9,000 seeds in a quart, but owing to various defects in planting and cultivation it is rare that over 3,000 plants are obtained. The Osage orange grows 60 feet high in Texas, but is smaller at the North. The wood is very durable.

The Horsechestnuts.

The Horsechestnut, (*Æsculus hippocastanum*) fig. 100, is a tree of moderate growth, becoming large, sometimes 80 feet high, with broad, spreading branches. On rich soils it grows with

Fig. 100.—*Horsechestnut.*

vigor. The wood is soft and of little value, the tree being cultivated exclusively for ornament. The young trees grow freely from the seed, which must not be allowed to become dry. They may be planted in autumn, or placed in small heaps on the ground, and covered with leaves or litter till spring.

Fig. 101.—*Ohio Buckeye.*

The Buckeyes.—The Small Buckeye, (*Æ. parviflora,*) is only a shrub, with leaves soft-downy beneath; flowering at the North as late as midsummer. Ohio Buckeye, (*Æ. glabra,*) fig. 101, is a tall tree, with fine, nearly smooth leaflets. Yellow or Sweet Buckeye, (*Æ. flava,*)

is a small tree or shrub. Red Buckeye, (*Æ. pavia,*) is a low tree, the flowers bright red and showy in cultivation.

The Ashes.

The several species of this genus (*Fraxinus*) embrace some of the most valuable timber trees, the wood combining lightness and strength in a high degree. The seed of all the species ripens in autumn, and should be kept in damp sand in winter, and sown in spring.

White Ash, (*Fraxinus Americana,*) fig. 102, is the finest and largest of the species, often reaching a hundred feet in height in the forest, with straight clean stem and branches. It is common throughout the Northern States, but is becoming scarce. Young, rapidly growing trees afford better timber than large slow growing ones.

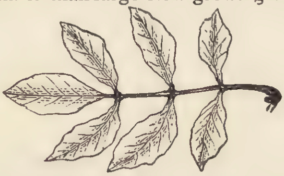


Fig. 102.– *White Ash.*

Fig. 103.—*Black or Elder-leaved Ash.*

Black Ash, (*F. sambucifolia,*) fig. 103, is a small tree, growing abundantly in swamps in the Northern and Northwestern States, and is valuable for its elastic wood, which divides readily into plates or strips, which are used for baskets or barrel hoops.

Blue Ash, (*F. quadrangulata,*) fig. 104, is a large forest tree of the West, growing on rich river bottoms, easily distinguished from the other species by its square branchlets ; the wood is more durable than that of the other species, and is excellent in quality.

Fig. 104.—*Blue Ash.*

Fig. 105.—*Red Ash.*

Red Ash, (*F. pubescens,*) fig. 105, is known by its velvety, pubescent young shoots and leaf stalks, and exists in the Eastern and Middle States, and occasionally in portions of the West. It is a tree of medium size and of moderate growth, the wood being similar to that of the White ash.

Green Ash, (*F. viridis,*) resembles Red ash, but has smooth leaves, bright green on both sides. It is a medium-sized tree, growing on the

banks of rivers in the West and South. It is a handsome tree, and with the exception of its smaller size, is equally as valuable as the White ash.

EUROPEAN ASH, (*F. excelsior,*) furnishes the weeping ornamental variety.

THE MULBERRIES.

THE RED MULBERRY, (*Morus rubra,*) is found in most parts of the Eastern United States, in rich woods and along streams, and is usually a low tree, but it sometimes reaches a height of 50 or 60 feet. Its wood is strong, compact, and remarkable for its durability. The fruit is cylindrical, red, turning dark purple, palatable, ripening about mid-summer. To obtain young seedlings, wash the seed from the pulp, when the berries are fully ripe, and sow them in a rich bed of mellow soil, covering them scarcely half an inch deep, and keeping the surface moist by shading.

THE BLACK MULBERRY, (*M. nigra,*) is a medium-sized tree, introduced from Eastern Europe; fruit nearly round, red, becoming black. It is not hardy at the extreme North. The White mulberry was formerly planted to feed silk-worms, but has nearly passed from cultivation.

Fig. 106.—*Sweet Gum.*

SWEET GUM.

The Sweet gum, (*Liquidambar,*) fig. 106, is a large, beautiful tree in low grounds, its native localities extend-from the southern portions of New-England to Illinois, and southwardly; has a fine-grained but not durable wood, a gray bark forming corky ridges on the branches, and smooth and glossy leaves, which being deeply lobed, present a star-like appearance. They change to crimson in autumn, and give a brilliant coloring to the woods where they grow. The flowers are greenish, and appear with the leaves early in spring. The wood is applied to various uses, but its chief value in cultivation is for ornament. The seeds are in a round woody fruit, set with points. They may be sown in autumn in a mellow soil and should be protected by mulching in winter; and they will germinate early in spring.

KENTUCKY COFFEE TREE, (*Gymnocladus,*) is found growing sparingly throughout the United States. It is a handsome ornamental tree, and its wood is fine-grained, compact and durable. Its generic name comes from two Greek words signifying *naked branch*, from their destitution of small shoots, and the appearance of the tree after the leaves have fallen. The tree is a rapid grower, becoming tall, straight and slender. It has twice-pinnate leaves—the leaflets remarkable for hanging edgewise. It flowers

in summer, the seed ripening in autumn in a large pod 5 to 10 inches long; the seed, half an inch across, is sometimes used as a substitute for coffee, and hence its English name. To raise young trees, plant the seed an inch and a half deep, in mellow soil, early in spring. Trees may likewise be raised from cuttings of the roots with bottom heat.


Fig. 107.—*Common Locust.*

THE LOCUST, (*Robinia pseudacacia*,) fig. 107, has been extensively planted for its timber, which is exceedingly hard, durable and valuable. It is a handsome ornamental tree only when young. It formerly suffered greatly from the locust-borer, which destroyed many valuable plantations, but this insect has diminished in numbers. When large and compact plantations are made it attacks only the outside. The locust is easily raised from seed, provided they are first swollen by scalding, without which they will not germinate.

HONEY LOCUST, (*Gleditschia tricanthos*,) fig. 108, grows wild in the rich soils of the West, and south of Pennsylvania. It becomes a large tree, often reaching a hundred feet in height, and a diameter of three feet. We have measured trees growing in rather poor soils that in 50 years were 55 feet high, and 20 inches in diameter. As an ornamental tree, it has a light, graceful appearance, without dense shade. Its value for timber does not appear to be settled. The formidable armature of its thorns has suggested it for hedges, and of late years it has been extensively planted for this purpose in the Northern States. Its extreme hardiness is strongly in its favor; but its tall, thin growth requires more cutting back, to give the hedge a compact, dense bottom than it commonly receives. Some trees have but few thorns, others are densely


Fig. 108.—*Honey Locust.*

supplied, and hence, in selecting seed for hedges, it should be gathered from the most thorny trees. The young trees are easily raised from seed which should be sown in rich soil, about an inch deep, in spring. The fact that the seed of the common locust or *Robinia* requires scalding, has led some erroneously to suppose the operation necessary for the Honey locust. A western species known as the Water locust (*G. monosperma*) has sometimes been mistaken for the above, but is smaller, and the wood is inferior.

BASSWOOD OR LINDEN, (*Tilia Americana*,) fig. 109—A large and lofty tree, growing throughout the Northern and Middle States. The wood is light and soft, and possesses little durability if exposed to the weather; but its clear white color and fine texture render it valuable for many in-door purposes. The inner bark is employed for ligatures for nurserymen, and for manufacturing into matting, for which purpose it is peeled in early summer, and soaked in running water for a few weeks, when it freely separates into thin layers, and becomes flexible. As an ornamental tree, when not crowded by other trees, it assumes a symmetrical and somewhat formal shape with dense foliage. The seeds may be sown in autumn when ripe, or kept in slightly damp sand till spring, when they germinate freely. The seedlings are easily transplanted.

Fig. 109.—*American Basswood.*

WHITE LINDEN, (*T. heterophylla*,) has larger leaves, with a white down beneath.

EUROPEAN LINDEN, (*T. Europea*,) grows to a large size, and is much planted as a shade tree.

CATALPA, (*Catalpa bignonioides*,) fig. 110.—This tree, which grows to a large size, is conspicuous for its broad, light green leaves, and the large, showy panicles of its white, purple-dotted flowers. It is indigenous in the Southwestern States, and although slightly tender at the North, will succeed well on deep, porous soils, with a dry bottom. The wood is light and very durable. It is said that fence posts have stood forty years without decay. The seeds, which ripen in a long, slender pod, grow freely, and the young trees

Fig. 110.—*Catalpa.*

are easily raised in great numbers. In the most northern regions where it will endure the winters, the seed rarely ripens, and must be obtained farther south, or in the Middle States.

BUTTONWOOD OR PLANE TREE, (*Platanus occidentalis*,) a well known tree, growing to great size, is common along streams and on river banks in the Northern, Middle and Western States. Its timber and wood are of little value.

THE MAGNOLIAS, consisting of several native and introduced species, are chiefly valuable as ornamental trees. The hardy CUCUMBER TREE, (*Magnolia acuminata*,) which is found scattered from New-York to Illinois, is one of the largest and hardiest of the genus, often growing 60 or 70 feet high. It is much used as a stock for the propagation of the more ornamental sorts. The seeds must be kept fresh by mixing with damp sand, and sown early in spring. If they become dry, they will not germinate. The young plants should be shaded from the sun's rays, and protected by a covering of evergreen branches the first winter.

Failure often occurs in transplanting Magnolias, the roots being sensitive to air and exposure. In taking them up all the fibrous roots should be carefully preserved, and they should be shielded from the drying influence of sun and wind. They should always be transplanted in spring, and never in autumn. as all trees are rendered more susceptible to the cold of winter by removal. Among the more desirable species are the following:

GREAT-FLOWERED MAGNOLIA, (*M. grandiflora*,) the only perfectly evergreen species; a splendid tree with thick leaves, shining above and usually rusty beneath; flowers large, white and fragrant.

GREAT-LEAVED MAGNOLIA, (*M. macrophylla*,) a small tree with leaves two or three feet long, downy and white beneath, with a very large, open, bell-shaped flower, often eight or ten inches in diameter when spread, blooming early in summer. It is not entirely hardy north of 40 degrees latitude, but succeeds well if planted along the borders of evergreen screens in localities where the winters are not severe, as far north as 43 degrees.

Fig. 111.—*Sweet Bay Magnolia.*

UMBRELLA MAGNOLIA, (*M. tripetala*,) grows wild in Pennsylvania and southward, and is a low tree, with very large leaves crowded in an umbrella shaped circle on the ends of the flowering branches; the flowers are white, five or six inches in diameter, appearing in June.

SWEET BAY, SMALL MAGNOLIA, OR SWAMP LAUREL, (*M. glauca*,) fig. 111, is a shrub or small tree, growing in swamps as far north as New-Jersey, the leaves glaucous beneath, almost evergreen, and the white, globular flowers

very fragrant. It will not succeed in limestone soils unless budded on the *acuminata*.

THOMPSON'S MAGNOLIA is a hybrid of the *glauca* and *tripetala*, flowering in June, and continuing several weeks, and is probably the most fragrant of all the Magnolias.

Among the exotic species are the following:

YULAN OR CHINESE WHITE MAGNOLIA, (*M. conspicua*,) fig. 112, is a small tree of surpassing beauty when in bloom, its profuse masses of clear white flowers appearing early in spring, before the leaves.

Fig. 112.—*Yulan Magnolia.*

PURPLE MAGNOLIA, (*M. purpurea*,) is a shrub; the showy flowers, which are pink-purple outside and white within, beginning to appear before the leaves.

SOULANGE'S MAGNOLIA is a hybrid between the two preceding; its flowers are later than the *conspicua*, and it is more hardy. It is very widely disseminated. *Magnolia obovata* is a small shrub, which blooms early, with large, showy, light purple flowers.

THE TULIP TREE, (*Liriodendron*,) fig. 112, known also by the uncertain names of "Poplar" and "White-wood," belongs to the same order as the Magnolia, and is readily distinguished by the peculiar form of the leaf. It is one of the most magnificent of our forest trees. It has large, showy flowers, which give the trees when in bloom a rich and imposing appearance. The seeds from young trees, and many from old ones, are abortive, and hence a large quantity often produces but few trees. The best are obtained from the upper branches of old trees. They may be sown in autumn or kept slightly moist in sand till spring. The young trees are difficult to transplant with success, and for this reason they should either be set out when only two years old, or else prepared by removing every two years. The wood is valuable for lumber, if the trees have been allowed to grow large. When set out for timber plantations, each tree should therefore be allowed eight or ten feet space, with smaller trees for early cutting set between. It forms one of the largest of American forest trees; the writer once measured one in Cayuga County, N. Y., after felling, which was 124 feet high, and 6 feet in diameter, and by counting the annual rings it was found to be ninety years old when Columbus discovered

Fig. 113.—*Tulip Tree.*

America. Trees even larger than this have been found, or 140 feet high and 9 feet in diameter.

THE ENGLISH HAWTHORN.—As a beautiful ornamental tree, this deserves notice. It is a small tree, extensively used for hedges in Britain, and succeeding for this purpose in some of the cooler portions of the United

Fig. 114.—*Weeping Hawthorn.*

States. Its varieties furnish profuse bloom, of white, pink and red flowers ; and like many other trees, it has been found to assume a weeping form, one of the finest specimens of which is represented in the accompanying engraving (fig. 114.)

AILANTUS, (*Ailantus glutinosa,*) a native of China, was introduced many years ago into the United States, and for a time was exceedingly popular as a shade tree for cities. Its tendency to sucker, and the offensive odor of its staminate flowers, afterwards caused its general rejection. It is still planted to some extent in the country. It grows very rapidly when young, and afterwards more slowly. It has been extensively planted in the plains of Southern Russia, and it might prove valuable in those towards the Rocky Mountains. The wood is hard and fine grained, and is well fitted both for manufacture and for fuel. It is easily raised from seed,

propagates freely by suckers, and young trees may be obtained from cuttings of the roots.

The name is sometimes spelled erroneously *Ailanthus*, as if from the Greek word signifying *flower*, but being derived from the Sanscrit *ailanto*, the *h* is properly omitted.

Coniferous Trees.

These include nearly all our evergreens, as the pines and spruces, and a few deciduous trees, as the larch and deciduous cypress. Many of them are distinguished for their ornamental effect, especially in winter, and some of them are of great value for their timber. They constitute a large portion of the forests of the United States, and a late writer has justly remarked that they have contributed more to the wealth of the country than the richest mines of gold and silver could have done. Nearly all the wood sawed into lumber has been the product of coniferous trees. The great demand for these purposes has led to the destruction of much of our most valuable forests, and the large pines of the State of New-York have become entirely exhausted, and in many other States they are rapidly disappearing. It would be a wise provision on the part of land-owners to secure young plantations, either by the renewal of those which are cut away, or by special artificial plantings on land suited to their growth, or by broad timber belts for the double purpose of protection and for the future supplies which the timber will afford.

Propagating Conifers.—The small seeds and the delicate character of the young plants, render the raising of the seedlings a work of considerable difficulty, and those not familiar with the process will find it better to purchase the young trees from those who make it a business. They may be had at low prices when only a few inches high, and at moderate rates when they have grown two or three feet. Those who desire to attempt raising the trees should observe the following requisites: The seed should be fresh and good, purchased of a careful and reliable dealer. Some seeds become nearly worthless in a single year. The soil should be light and rich, and made as fine and friable as practicable. The seeds may be sown in beds about four feet wide. The rule, to cover them to a depth not exceeding five times their diameter, should be observed. One of the best modes is first to make the beds smooth and even, and then, after sowing the seed, to sift on fine, rich prepared soil to the repuisite depth. The seeds being usually sown broadcast, a large number are planted on a given area; the most successful cultivators place about five seeds of the Norway spruce to a square inch. As soon as the seed is planted, and for three or four months afterwards, the beds should be shaded, for the double purpose of protecting the plants from the hot sun, and for preventing the sweep of drying winds over the surface and preserving the moisture of the soil. The shades are commonly made by nailing strips of lath on cross pieces of convenient length, so that about

one-half or more of the full amount of the sun's rays shall be intercepted. These rest on frames a few inches above the surface. Shades may also be made of brush placed in sufficient thickness to intercept at least one-half the sun's rays.

Before winter sets in the young plants should receive a covering to protect them from heaving by frost. This may be a moderate coat of forest leaves, held down from blowing away by brush; or light straw, or small evergreen branches.

When about two years old the seedlings should be taken from the seed beds and set out in rows. When from one to two feet high they may be removed to permanent plantations. In transplanting, more care is required than for deciduous trees. The roots should be lifted out, not pulled, and not be exposed to the air long enough for the outside to become dry; and to accomplish this end it is safest to coat the roots by immersing them immediately into a prepared bed of soft mud. When set out the roots should be spread out evenly on all sides, and then compactly covered with soil, which, if rather dry, should be settled by pouring in water, covering the whole with a finishing of pulverized earth. Should the weather become quite dry, never water, but apply a mulching to the surface. As coniferous trees are disposed to throw out many side branches, they should be planted rather thickly in the plantation for timber, to cause the trunks to become tall, straight, and free from knots.

The Pines.

The pines, embracing many species, afford some trees of a highly ornamental character; while in an economical view the immense quantities of lumber they annually produce attest their great value, to say nothing of pitch, tar and turpentine of the South.

White Pine, (*Pinus strobus*,) is one of the most valuable species. The dense forests which formerly existed in New-York and adjacent States, and where trees 140 to 160 feet high were not uncommon, have been cut away and have nearly disappeared. Hence the importance of new plantations. Bryant remarks that "in forming plantings for timber it may be a matter of economy to plant the young trees eight feet apart each way, and afterwards fill up the intermediate spaces with trees of easier propagation and culture, to be cut out as the pines increase in size. The White and Golden willow are among the best for this purpose." The seed for planting should be gathered early in autumn, as the cones then open and drop the seed soon after. The treatment in planting and cultivation has been already given under the general head of coniferous trees. The young trees require care by lifting, not pulling, out the roots, and in keeping them from becoming dry by a coating of mud, as already described under the same head. When young trees a few feet high are removed from the borders of woods, transplanting will be successful if a heavy mass of earth is taken with the roots; if denuded, they will as certainly perish.

Pitch Pine, (*P. rigida,*) fig. 115, is found in the Atlantic States north, and in the upper country farther south. It is a stout tree with dark green leaves, usually not over 30 or 40 feet high on poor soils, but on better land, farther south, it is often 70 feet high. It is much less valuable for timber than the preceding.

Fig. 115.—*Pitch Pine.*

Scotch Pine, (*P. sylvestris,*) fig. 116, is abundant in Northern Europe, and has been much planted in this country. It is easily raised from the seed, and the young trees grow rapidly. The wood is hard, resinous and durable. It is well worthy of recommendation for timber belts and plantations. It is not equal to some other species as an ornamental tree.

Fig. 116.—*Scotch Pine.*

Red Pine, (*P. resinosa,*) fig. 117, is wrongly called *Norway Pine*, and the name *resinosa* is not appropriate, as it is not particularly resinous. It is common in the Northern States, and is 70 or 80 feet high. The wood is heavy, strong and durable. It forms a handsome ornamental tree.

Fig. 117.—*Red Pine.*

Fig. 118.—*Yellow Pine.*

Yellow Pine, (*P. mitis,*) fig. 118, is a medium sized tree, with firm, fine-grained wood, and the lumber from it is very valuable, and commands

a higher price than the White pine. It is a fine ornamental tree, and is worthy of cultivation.

Austrian Pine, (*P. Austriaca,*) is introduced from Europe, and has been extensively planted for ornament.

There are some other species worthy of notice, among which are *P. cembra*, or Stone Pine, remarkable for its large, oily seed, a handsome tree of slow growth; *P. tœda* or Loblolly Pine, a large Southern tree, of little value for timber; *P. ponderosa*, a Californian species, hardy at the East, and making a very handsome ornamental tree. It is distinct from *P. Benthamiana*, with which it has been confounded, and which is more tender. *P. larico*, or Corsican Pine, is a very rapid grower, handsome, excellent for timber, but slightly tender at the North.

The Larches.

European Larch, (*Larix Europea,*) an extensively planted European species, growing with great rapidity, is one of the most valuable timber trees on upland soils. On low, rich, moist soils the timber is less durable. It is easily raised from seed, and the young trees make a vigorous growth. It is worthy of extensive planting when the soil is adapted to its best success.

American Larch, (*L. Americana,*) known also by the names Tamarack and Hackmatack, is a more slender tree than the preceding, and is thinner of foliage.

The Spruces.

The Norway Spruce, (*Abies excelsa,*) is a handsome, very hardy, rapid-growing tree, sometimes attaining a height of 140 feet, and occasionally even more, for which size about a century's growth is required. The timber is hard and tough, varying in durability with the soil on which it is grown. The young timber is better than that of most evergreen trees, and may be used to advantage while the trees are less than a foot in diameter. For ornamental purposes the trees vary much with the peculiar growth of individuals, those with copious drooping branches being much finer in appearance than the stiff and meager ones. Hence the importance in selecting trees for this purpose, to choose those when young which promise the best ornamental effect. Fig. 120 is a poor representation of a tree on the grounds of the writer, planted sixteen

Fig. 119.—*Abies excelsa.*

years, 25 feet high, and with 16 feet spread of branches. The drooping shoots of the horizontal branches measure three to four feet long.

The Norway spruce is one of the best of all trees for belts as screens. The ease with which it is raised, its rapid growth, and safety in transplanting, give it eminent superiority over most other evergreens.

Fig. 120.—*Weeping Norway Spruce.*

The seeds ripen late in autumn, and they may be obtained from the cones by spreading them in the sun or in a warm room, until the seeds drop out. A bushel of cones will yield about half a pound of clean seed. The young plants grow very slowly at first, but in a few years become more vigorous, shooting up several feet in a year in a good soil with clean culture. They may be set for screens where immediate effect is desired, 4 or 5 feet apart; but if set 10 feet, will grow to touch in 12 years. For timber 4 or 5 feet apart is far enough, the intermediate trees to be thinned out when partly grown.

THE HEMLOCK, (*Abies canadensis,*) grows in the northern parts of the Union from the Atlantic to the Pacific oceans, and extends as far north as Hudson's Bay. Vast quantities are sawed into boards, joists and other timber. When allowed free growth in open grounds, it becomes one of the most beautiful of all evergreen trees, its graceful form, absence of stiffness and formality, and the fine bright green of its foliage, being scarcely equalled by any other tree. It forms handsome screens, and grows well in the shade; hence the interiors of clipped hedges preserve the denseness of their foliage. When raised in nursery rows, the hemlock is not difficult to transplant; but if young trees a few feet high are taken from the borders of woods, a mass of earth must be taken on the roots to insure success.

BALSAM FIR, (*Abies balsamea,*) grows in the colder regions of North America. Its usual height is about 40 feet when full grown, with a diameter of a foot or more. The timber is not valuable. It is a handsome tree

when quite young, but rapidly loses its ornamental appearance as it advances in age, unless planted in deep, rich soil.

MENZIES' SPRUCE, (*A. Menziesii*,) was introduced from the Rocky Mountains. It forms a handsome symmetrical tree, with dark green foliage, about the color of young trees of the Balsam fir, but the growth is more dense, rich and luxuriant. The cones are about three inches long. A tree of this species planted on our grounds seventeen years ago is now 30 feet high and 8 inches in diameter, and the spread of the branches at the base is 12 feet. It is not so rapid a grower as the Norway spruce. A tree of the European larch, planted at the same time and on the same ground (which has never been cultivated,) is 39 feet high, and 13 inches in diameter.

THE CYPRESS.

DECIDUOUS CYPRESS, (*Taxodium distichum*,) belongs more particularly to the Southern States. It grows and is much planted in the Middle States, and it endures the winters at the North; but its growth is comparatively feeble in severe climates. In the South, where it is mostly confined to the low grounds and swamps, it becomes a large tree, often attaining a height of 120 feet, with a straight clear trunk, and a spreading mass of branches at the top; the branchlets are slender, many of them falling with the leaves. The leaves are light green, half an inch long, and two-ranked. The cones are about an inch thick. The wood is fine grained, becoming reddish on exposure; it is light, strong, elastic and durable. Posts last a long time, and shingles are known to endure forty years. When growing in swamps it is called White cypress; on upland, Black cypress, where the wood is heavier and darker colored.

It would prove valuable for cultivation as far north as 38 degrees latitude, if moist, rich land could be chosen. It is easily raised from seed by sowing in vessels filled with a mixture of mould and sand, covering lightly, and protecting the young trees from the sun's rays in summer, and the frost in winter. They should be transplanted while small, as the roots run downwards and render removal difficult. The seed may be procured by selecting the cones early in spring, and storing them in a dry place. Those which fall out first are the best and most likely to germinate. Trees may be also raised from layers and cuttings.

THE ARBOR VITÆ.

AMERICAN ARBOR VITÆ, (*Thuja occidentalis*,) is a common tree in the North, in cool, moist woods and swamps, extending into Canada. It grows well when transplanted to upland soils, and is not unfrequently found in rocky situations and on the banks of streams, Its usual height is about 40 or 50 feet, with a diameter of 12 or 15 inches, but trees are occasionally seen nearly 2 feet in diameter. In regions where it is used for timber, it is generally called White cedar, a name which properly belongs to *Cupressus thyoides*. The timber of the Arbor Vitæ is very

durable, at the same time that it is light, soft and easily worked. It is much used for fence posts, which commonly last thirty or forty years. On gravelly and well drained land they will last much longer. Rails kept above ground and exposed to the weather will last fifty or sixty years. The Arbor Vitæ is moderate in growth, but it would doubtless be profitable for timber plantations.

It is much planted for hedges and screens. It will bear pruning to any degree; but as it does not flourish well in shade, the outside of screens should be cut back irregularly, instead of shearing to an even surface, a practice which makes a dense exterior, leaving the interior bare branches. For the same reason it should not be planted for screens in the shade of other trees. For such situations Norway spruce and hemlock succeed better. For a low screen, for immediate use, the trees may be planted within a foot or two of each other; but it will succeed better eventually if set 5 or 6 feet apart, which spaces will be filled in eight or ten years if the ground is cultivated. It roots freely by layers and cuttings.

This species, when raised from seed, runs much to varieties, especially in nurseries. There are several named sorts in cultivation, among which that known as *Siberian arbor vitæ* is one of the finest, the tree being smaller, the foliage more compact, and the color a finer green. The *Heath-leaved* has loose, awl-shaped leaves, of a dark bluish green, which, however, become brown in winter.

CHINESE ARBOR VITÆ, (*Thuja orientalis*,) called also *Biota orientalis*, is partly tender, and does not succeed well in the Northern States. Variety *Tartarica* is more hardy, glossy green; the leaves scale-shaped. Variety *aurea* or Golden, is dwarf, very dense, and a yellowish green.

THUJA GIGANTEA is a large species, growing west of the Rocky Mountains, and often attaining a great height. Nuttall speaks of trees 200 feet high, and over 10 feet in diameter, but this size is very rare. It is not hardy enough for all winters at the extreme North.

RED CEDAR, (*Juniperus virginica*,) is well known throughout the eastern portion of the Union as a small tree, furnishing a handsome, reddish, odorous wood of remarkable durability. When more abundant, it was much sought as fence posts; it is still extensively employed in the manfacture of lead pencils. The tree sometimes grows 30 or 40 feet high, varying much in form of growth, mostly assuming a spreading, irregular shape, but in some localities, and especially along the lower part of the Hudson river, growing upright like the Lombardy poplar. The tree is of slow growth. The seeds are to be gathered late in autumn, the pulp rubbed or washed off, then mixed with an equal quantity of moist sand, and kept shaded with a mulch till the second year, when most will grow. Or they may be planted the spring after gathering, when a portion will germinate, and the seed bed being shaded by mulching, most will grow the second year. The young plants should be protected from the sun while small.

THE COMMON JUNIPER, (*J. communis,*) is an erect or spreading shrub, with very sharp pointed leaves green below and white above. It is planted chiefly for ornament.

GREAT TREE OF CALIFORNIA, (*Sequoia gigantea,*) a native of the Sierra Nevada range of mountains, is of such vast and magnificent proportions that all common trees sink into insignificance before it. Hoopes says: "Just think of a man on horseback riding a distance of 75 feet in the hollow of a tree, and emerging from a knot-hole in the side!" Prof. Brewer says: "The trees are very abundant along a belt of 5,000 to 7,000 feet altitude, for a distance of more than 25 miles, sometimes in groves, at others scattered through forests in great numbers. You can have no idea of the grandeur they impart to the scenery, where at times a hundred trees are in sight at once, over 15 feet in diameter, their rich foliage contrasting so finely with their bright cinnamon-colored bark. The largest tree I saw was 106 feet in circumference (33 feet in diameter) at 4 feet from the ground. It is 276 feet high. [Some have been found much higher.] There are immense numbers of younger trees of all sizes." The taller trees, if set in New-York City by the side of Trinity steeple, would tower more than a hundred feet above it. It is estimated by counting the annual rings that some of these giants are 3,000 years old. If so, they must have been growing in the days of Homer and of the prophet Elijah, and "the Roman Empire has begun and ended" since they were living trees. It is believed that some of these estimates have been too great, as the central portions, being hollow, could not be counted, and they may have grown faster when young than afterwards.

Fig. 121.—*The Great Tree of California.*

It is not probable that the *Sequoia* can be profitably cultivated for timber, but it has been planted to some extent as an ornamental tree. It is scarcely hardy in the Northern States, and needs some winter protection when small. Ellwanger & Barry of Rochester, N. Y., have trees on their grounds 22 years old, which are now 34 and 35 feet high, and which endure the winters well, with the exception that the shoots are sometimes slightly touched with frost.

This species was named by Lindley, as Hoopes remarks, "against both rule and taste," *Wellingtonia*, after a British soldier who had no claim to science, and by Kellogg it was named *Washingtonia.* When botanists showed subsequently that neither of these names could stand, and that it

belonged to the old genus *Sequoia*, the name Washingtonia was at once given up by Americans, but the English still persist in adhering to the name Wellingtonia.

Fig. 121 represents the trunk of a tree, supposed to be the largest discovered, (named the "Father of the Forest,") the height of which when standing must have been over 400 feet.

—— In selecting trees worthy of being chosen for timber plantations, the following are particularly worthy of recommendation: *European Larch, Sugar Maple, White Oak, Chestnut, Black Walnut, White Pine, Scotch Pine, Norway Spruce, Locust, White Ash.* This list will be varied and increased in different localities with the local adaptation of other sorts.

—— The writer of this article is indebted for valuable suggestions in preparing it, to Bryant's work on Forest Trees, and to Gray's botanical works.

NOTES ON STRAWBERRIES AND RASPBERRIES.

By T. H. Burgess of Ulster County, N. Y.

NEW FRUITS, like new friends, afford new pleasures. Some of them, after sufficient acquaintance, prove to be pleasant and valuable company—"real acquisitions." The charm of others is in the remembrance that they cost us $3 each, or $5 per dozen. Some of these may afford other ministries, for there is some real satisfaction in tearing out even costly humbugs, and in detecting old robbers under new names, or in making the acquaintance of the offspring of old and well-known fruits which have inherited some of the good qualities of their parents without being much improvement over them. All honor, however, to those enthusiastic fruit lovers who are year after year bestowing labor and watchful care in the laudable purpose of producing new and useful fruits to fill some vacant niche in the list.

We have room for many more new and useful fruit of the class "excellent," but "good" and "very good" are degrees of comparison in the pomological grammar scarcely high enough to pay the cost of testing. It is not to be expected that the heroes of the turf will at the same time be best at the plow or cart; so we should not be surprised that the Wilson strawberry holds its place as the leading market berry, or that the Hovey Seedling recently took the first premium at a Boston exhibition. (Whether the committee were nurserymen who had "plants to sell," or were gentlemen of the old school, in whose memories live the loves of boyhood, it matters not—they are perhaps half right.) But the Hovey is pistillate, and the Wilson is too acid; the Triomphe de Gand and Jucunda too tender, and need very rich soil. So there is yet room for the "ideal" strawberry,

which must have staminate flowers, be a strong, healthy grower, adapted to all soils, color showy and lasting, have excellent flavor; firmness, size and productiveness all satisfactory.

And there is also room yet for a red raspberry which shall unite the firmness, size, beauty and flavor of the Antwerp with hardiness and general adaptation to soils.

The following list of newer berries has proved satisfactory in the points briefly described, during the past two or three years' trial. The drawings are from average well-grown specimens as they fruited this year:

THE MONARCH OF THE WEST, (fig. 122,) is a large berry of excellent flavor; it produces large fruit to the close of the fruiting season; is a strong grower, but does not color evenly, or appear to be quite so productive as desirable. It is a promising "40-to-the-quart" variety however, which on farther trial may spread its kingdom eastward.

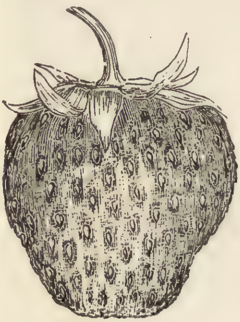


Fig. 122.
Monarch of the West.

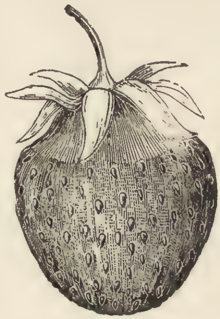


Fig. 123.
President Wilder.

THE PRESIDENT WILDER, (fig. 123,) is a good grower, large, of dark glossy color, long neck; rather a shy bearer; flavor peculiarly rich, and of such excellence as to make up for deficiencies. It should be in every amateur's collection.

THE BLACK DEFIANCE, (fig. 124,) like the President Wilder, possesses a very fine flavor, which will cause it to be retained by those who esteem quality as preferable to quantity. It is a moderate bearer, and of deep rich color.

Fig. 124.—*Black Defiance.*

SETH BOYDEN, (shown on page 240, vol. VII, RURAL AFFAIRS,) is one of the best large market berries. Its size, solidity, showy color and productiveness make it very desirable in some localities. On rich clay soils with winter protection, it produces very profitable crops. Its flavor is very good. In some localities it seems to be not so hardy as the Wilson, and sometimes does not color and fill out to the end, but presents either a flat, green, seedy terminus, or a greenish white point. The demand for this variety is increasing, and it is well worth trial.

THE MATILDA, like the Seth Boyden, does very well on good soils, and with

winter protection. Like its parent, the Jucunda, it likes a deep rich soil, and is very large and showy. It is a strong grower, and is prolific. Its originator, after testing many sorts, grows only Wilson and Matilda for market.

THE KENTUCKY, (fig. 125,) is the best late strawberry for market. It is a strong grower; hardy; is a moderate bearer; very firm; of bright, showy color; flesh a pearly white; flavor very good; and yields large sized fruit to the close of the season. It continues bearing a week after the Wilsons are gone.

Fig. 125.—*Kentucky.*

Fig. 126.—*Chas. Downing.*

THE CHARLES DOWNING, (fig. 126,) is so widely known as scarcely to belong to this list. It is a hardy, strong grower; does well on most, if not all soils; yields good crops of highly flavored, bright scarlet berries of fair size, generally large. To many palates it possesses an excellence of flavor that would be satisfactory in the "ideal strawberry." It has not quite the firmness necessary for shipping to distant markets, but for near market or home use it is no discredit to the honored name it bears.

THE WM. T. DUNCAN, (fig. 127,) is the latest comer among our new strawberries. It is a seedling of the Russell, raised by Mr. J. G. Lucas of Ulster County, N. Y., which has proved very profitable for the last two years. It is large, bright red; holds its color well; firm; a good grower; and has equalled the Wilson in productiveness. Its flavor is similar to, but better than that of the Russell, and its flowers are perfect.

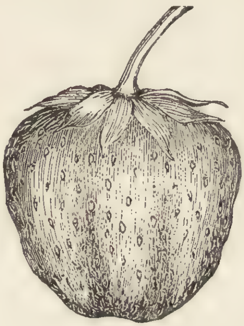


Fig. 127.—*Wm. T. Duncan.*

THE COL. CHENEY has not been sufficiently tested by the writer, but is highly commended by others as a very large and showy market fruit; its flowers require the presence of staminate varieties for complete fertilization.

In strawberry culture little that is new has obtained favor. Many growers keep all runners off the first year, and then let them run the second year, plowing the vines under after the second crop. Mr. J. G. Lucas has adopted a plan which is a very successful one. He allows each plant set in spring to throw out two runners, and roots the young plants about a foot out on either side of the parent, and opposite the open spaces between the

older plants, (as shown in fig. 128,) and permits but one young plant to remain on each runner. Thus three rows of plants are formed, which yield much more fruit, and of larger size than if the plants had been allowed to grow in matted rows. The hoe may be readily passed between the plants, and the ground more economically used by this means than by single rows. After fruiting, the middle row of older plants may be cut out if they appear exhausted, and only the outside rows of younger plants kept for the next year.

Fig. 128.

Another successful grower plants a patch in August every year; two rows 12 inches apart, and two more the same distance apart, 18 inches from the first pair. After fruiting the first time, one of each pair of rows is plowed under, and the others left 30 inches apart for the next year, which are allowed to run and cover the ground.

Plants set in the fall send out runners early, and make good plants for August setting. If the weather is dry when it is desired to set in August, it is necessary to shade the young plants. Old berry cups are useful for this purpose. Thousands of these, too much stained for shipping fruit, can often be obtained of fruit growers and used to turn over the young plants until they have made a fair start.

In marketing, pints and thirds are most used for strawberries, although many use quarts. Yet the larger the package, the more the fruit is likely to injure; wide shallow cups holding a third of a quart are generally found to pay best. For a similar reason the Beecher half-pint is becoming very popular for shipping raspberries.

Red Raspberries.

Among the newer red raspberries, the Herstine stands at the head of the list for color, size, flavor and productiveness. It is sufficiently hardy to pass the winter if bent to the ground, and held in place by a stone or rail, or shovelful of earth. It is a strong grower, bears large fruit even on poor soil, but unless picked daily with much care, it is too soft for distant market.

Fig. 129.—*Naomi.*

The Naomi, (fig. 129,) is large and roundish; seed lobes large; liable to crumble; pleasant acid flavor; too soft and juicy for distant market; but as it is hardy and productive, and continues long in bearing, it is valuable for home use.

By some it is believed to be identical with the Franconia. The writer has the genuine Franconia and the Naomi growing not far apart, and although similar in several respects, the Naomi is darker in color, more acid, larger, hardier, and more regularly globular in shape; seed lobes larger and not so compact. The Naomi may be a seedling of the Franconia.

THE FRANCONIA should be in every garden; its flavor is so sprightly, and its color so beautiful, it will always be welcome on any table. If the plants are partially protected in winter, and the suckers kept down pretty well, it will yield plentifully for a long season.

THE BRANDYWINE, (fig. 130,) is a showy fruit; roundish; bright red; retains its color when very ripe; flavor moderate; very firm; not juicy; seed lobes serrated and crowded compactly, making it the best berry that we have for shipping long distances. The canes are perfectly hardy.

Fig. 130.—*Brandywine.*

Fig. 131.—*Turner.*

THE TURNER, (fig. 131,) has been variously spoken of in New-Jersey and the West. One year's trial proves it to be hardy, medium to large in size, darkish red, a good bearer, though not prolific; flavor good; ripens its crop early, and in a short time; firm enough to market well if picked daily, and is quite tenacious, and will not melt down like the Herstine or Naomi.

THE HIGHLAND HARDY, (fig. 132,) is believed to be a native variety, which has proved to be a very reliable and profitable fruit. It ripens the earliest of the raspberries, and yields nearly half its crop before other sorts are fairly beginning to ripen. The whole crop is usually marketed in about two weeks. Its flavor is very good; color light red; size medium to small, unless grown on rich soil, when its size is quite satisfactory. It is hardy, succeeds on any soil, and is very prolific. It is not commended for size or flavor, but as it has paid in the New-York market for five or six years past, from $300 to $1,000 per acre, those who grow it are satisfied; and as its flavor is very

Fig. 132.—*Highland Hardy.*

good, and it carries well to market, and can be afforded at moderate price, and as a quart of small berries goes as far as a quart of large ones in a family, buyers have no good reason to complain. If this fruit had the size of the Herstine, it would doubtless supersede all others as a market fruit.

There are five or six other new sorts which have not yet been sufficiently tested, but it is to be hoped that as our famous Hudson River Antwerp passes off the stage, some other as good a berry, but of hardy growth, may take its place.

Culture of Raspberries.

There are a few points in raspberry culture worth stating, perhaps not new, but good enough to bear repeating. If fruit alone is desired, all suckers should be kept down like weeds, except from two to four in a hill, according to the nature of growth. Of Philadelphia or Herstine, two are enough ; if of the more slender sorts, three or four are enough—five are too many.

It is often convenient to extend a plantation in summer, which may be readily done by taking up green plants which are in the way of the plow. These can be safely set from June to August in rainy or damp times. The plants should be taken up carefully and immediately set deeply and well tramped.

If green plants are to be taken any distance, the roots should be well mudded, and the tops kept wet and in the shade. Mulching is also very useful. If the weather is favorable, the plants will make a good stocky growth and bear a nice lot of fruit the next year, and send up plants for a full crop the second year. One

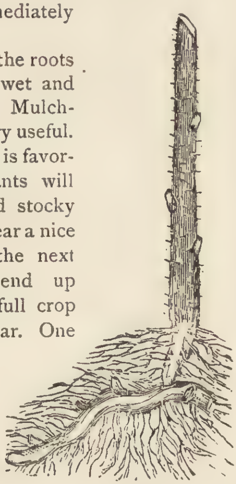


Fig. 133.—*Good Plants, showing the buds on the cross-root, which will make good new plants the first year.*

year's time is thus gained. Many acres have been set in this way in Ulster County.

If good plants are wanted, take them up between the hillls so carefully that the cross root, with all the fibrous roots on the stem itself may be preserved. (See fig. 133.) No small damage is done to the hills sometimes

by pulling out the extra canes for plants, instead of cutting them off and leaving the roots undisturbed. Besides, such plants are seldom worth setting. See fig. 134, which represents poor plants which have been pulled up and have no buds on the roots, and will either die or not make good hills the first year. Better pay four times the price, and get all good young plants, with plenty of roots, than take such as have been pulled from the hill, or parts of old hills dug up and separated. Such plants make feeble plantations, while first-rate plants yield a paying crop the next year after setting.

Fig. 134—*Poor Plants.*

One or two good plants in a hill will do if the tops are cut back close, say not over a foot in length, so that the whole strength of the root is thrown into the young canes the first summer.

Many a plantation has been kept back a year, and sometimes ruined, by neglecting to cut off the tops of the plants, or trying to get a little fruit the first summer.

Fig. 135.—*Old Plant.*

Next to summer setting of green plants, early spring is the best time to set, and the plants should not be taken up until spring. Fall setting is often good, but frequently in open winters the plants are injured. Nor is it the best plan to take up raspberry plants in the fall and heel them in in bunches. They are often injured materially, and the fibrous roots are frequently destroyed, unless great care is taken to protect them, and the earth well mingled with the roots.

To conclude, permit the repetition of the following advice :

Set *good* plants early in spring, and cut back the tops almost to the ground.

If you have plants to sell, it may be you can wholesale them to persons who will buy once and remember you oftener, especially if you pull them up and count all the tops.

Poor plants make very poor plantations, long coming into bearing, and not worth waiting for.

The Franconia Raspberry yielded fruit to the value of nearly $1,000 per acre, near Rochester, in 1875, at the rate of 16 to 20 cts. per quart. This was on the plantation of John Logan, according to a report in the Rural Home.

PRUNING BEARING ORCHARDS.

TREES WHICH ARE KEPT IN GOOD SHAPE while young will not be likely to need much pruning when they become older. Rubbing off with the fingers a small green supernumerary shoot in time, will save the trouble of sawing off a large limb in after years. But it is not often that orchards receive this perfect management; the owner is sometimes absent from home, or pressed with other cares, at the time when the pruning should be performed, and needless branches and dense brushy tops are the result. As the trees become still older the time required to cut away what is not wanted and is detrimental, continues to prevent the owner from giving attention to the subject, and he does not like to commit the work to a blundering laborer.

We have adopted a practice by which any hired man may prune an orchard of the most valuable trees, with as much accuracy and skill as it could be done by the best horticulturist, or by the owner standing by and directing every motion. We can do it even better, because any one can mark out work to greater advantage if he has but one object in view before his eyes, than if his attention is constantly distracted. We pass along the rows of trees, and with a piece of chalk in hand draw a line at the base of any limb requiring removal, at the exact place where the workman is to set in his saw or knife, as shown at *a a*, fig. 136. With this single object before us, we can do better than if constantly compelled to cut and then look, and cut and look continually. And we can thus point out to the man who has the saw the exact spot for cutting much better than to stand by and continue to give verbal directions. The owner may thus lay out in half an hour work enough to keep the laborer busy for half a day, and he needs no watching, for he cannot go wrong.

Fig. 136.—*A A, chalk marks to show the place for setting the saw.*

It usually happens that the limbs in a bearing orchard are beyond the ordinary reach of chalk in hand. In this case we attach the chalk to a slender pole, as shown in the accompanying figures. We find the small chalk cylinders used for blackboard exercises in schools the most convenient in this case. A round slender rod several feet in length is procured,

Fig. 137.

the smaller end of which is of the same size as the chalk cylinder. A strip of pasteboard is wound around this end and secured by a cord, and projects an inch or two beyond the end of the stick. In the pasteboard tube thus formed the chalk is inserted, so that the end only projects, as shown in fig. 137, or more at length in fig. 138. The marker is now ready for work. As the chalk wears away in marking, the pasteboard tube is slipped down a little, and thus it is ready for marking till all is worn away, when another replaces it. Fig. 138 is this marker on a smaller scale. This contrivance answers perfectly for all smooth barked trees, and we have found it a great convenience in pruning a large neglected pear orchard.

Fig. 139.
Chalk Marker.

But when the bark is rough and the limbs large, as in many apple orchards, common coarse chalk will be found to answer best. This may be inserted in a slender forked stick or pole, by shaving away a shallow groove on each side of the chalk where it is to fit into the fork, and tying it there, as shown in fig. 139.

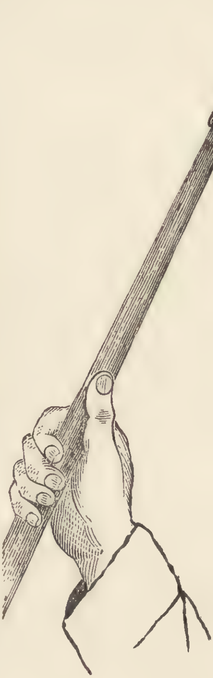


Fig. 138.

In pruning trees it is desirable to give them an even, symmetrical head, and branches not too crowded, and evenly distributed over every part; and special care must be taken to avoid the common error of thinning out in the middle or interior of the head, and leaving the smaller branches a dense mass over

Fig. 140.—*Pear Tree needing Pruning—dotted lines showing where limbs should be cut.*

the outside. It is better to *thin in* from the outside where thinning is needed. But where this is not the case there will be occasionally in nearly all orchards, crooked or crossing limbs that can be profitably spared. Fig. 140 represents a pear tree several years old, which has two limbs that may be cut off at the dotted lines and possibly some of the other branches may be removed to advantage. Fig. 136 represents a portion of this tree on a larger scale, showing the white chalk lines at *a a*, where the crooked limbs are to receive the saw.

FLOWERS AND GARDENING.

DOUBLE USE OF HYACINTH GLASSES.—If hyacinth glasses are selected with a view to their use both in holding hyacinth bulbs in winter and bouquets in summer, a little more care and expense for their ornamental appearance will secure a handsome effect. A correspondent of a London journal, in speaking of this double use, says of the effect produced by the colors of these glasses:

"White and gold, and purple and gold, both produce pleasing contrasts, but there are several other colors of which choice may be made according

Fig. 141. Fig. 142. Fig. 143.

to taste. When flowers are about to be arranged in such glasses, dark and rich shades should be selected for flowers of a light color, and bright shades for dark flowers. A spray of such a rose as the Duke of Edinburgh placed in a crimson-colored glass embellished with gold, looks well, as does also one of Gloire de Dijon, in a purple or dark blue glass; the arrangement in vases of this kind (if I may so term them) need not, however, be limited to one variety of flower. A white or tinted rose in the

style of Souvenir de la Malmaison, with a spray of Dicentra, one or two blue Forget-me-nots, and a few grasses and ferns would form a pretty mixture, some of these glasses may be purchased in the form of three combined, as shown in the accompanying illustration (fig. 142); when such triplets are used, of course more flowers must be employed in their decoration, such as roses, lilies, sweet peas, fuchsias, pelargoniums, dicentra and ferns and grasses of various kinds. The smaller vases are well adapted for mantlepiece decoration, or for small tables. The large kinds may be placed in the centre of a table of larger size, or a group may be formed on a side table. For a small breakfast table one of the larger-sized vases would form a pretty centre ornament, with a few small specimen-glasses grouped round it."

The accompanying cuts exhibit the appearance of neatly arranged flowers in these glasses, being occupied in fig. 141 with roses, in fig. 143 with Dicentra, and with a grouped collection in fig. 142.

Wire Baskets for Flowers.—One of the neatest flower stands is the wire basket and its support, represented in the accompanying cut (fig. 144.) The light appearance of the wire work accords well with the lighter and more graceful forms of such flowers as grow in loose panicles and racemes, with a few drooping ones for the sides. Heavy, large, massive flowers are not adapted to it. It is easily moved from place to place, and may be set in a parlor or drawing room, on a veranda or portico, or on a lawn.

Fig. 144.—*Wire Basket.*

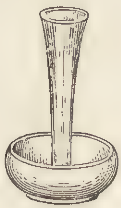


Fig. 145.

Fig. 146.—*Flower Vase.*

Flower Vase.—For a dining or centre table, the simple little translucent glass vase shown in fig. 145 may be used to great advantage. It is extremely easy to set it off with a handsome effect, as represented by fig. 146, by placing the larger and more massive flowers, as roses, in the lower part, with the lighter, more graceful or more drooping ones in the upper part. The figure shows a few fine roses below, with fuchsias, the smaller geraniums and a light rose above.

Making Bouquets.—Prof. Beal, of the Michigan Agricultural College,

showed us a neat mode for using the leaves of the Salisburia in making the bases of small bouquets, instead of employing pasteboard. The peculiar form and character of the leaves of this tree are shown in fig. 147, being broad, wedge form, the veins radiating from the top of the petiole. To make a neat bouquet, form a tube of tin-foil, like the lower or cylindrical part of fig. 148; place a few leaves of the Salisburia in

Fig. 147.—*Leaf of the Salisburia.*

Fig. 148.—*Finished Bouquet.*

the form of a broad funnel in this tin-foil tube, and then insert the flowers so as to form a dense mass by filling the funnel—as exhibited in the figure. The smooth green base thus made is handsomer and more appropriate than pasteboard, and is not injured when water is sprinkled on the flowers.

Fig. 149.—*Weeping Birch.*

WEEPING BIRCH.—There are some weeping trees that are not rendered more ornamental by the drooping habit; and there are others which are eminently graceful. Among the latter is the Weeping Birch. A tree of this sort now stands before our windows, imported from England 15 years ago, and now 35 feet high. Its brilliant white bark and elegant drooping branches render it an object of great beauty. It is more symmetrical in form than the accompanying cut, (fig. 149,) taken from Smee's Garden. The Cut-leaved Weeping Birch is one of the finest ornamentals.

BIRD-HOUSES.—The London Garden gives the following account of a German mode of constructing bird-houses for rustic effect:

In parts of Switzerland, and especially in the Cantons of Vaud and Neuchatel, a cylindrical wooden or earthenware nest has been distributed

with very satisfactory results in gardens, plantations, &c., serving as a family mansion for the starling, titmouse, woodpecker, and other birds which build in holes and hollow trees. In Germany, on the other hand, the hexangular boxes indicated by figs. 150 and 151, are the ones mostly in use, and very "eligible bijou residences" can be constructed of bark, cork, cocoa-nuts, wired-moss, and lichen. As a rule, the opening of the nest should face the east, and on deciding on the exact position of the domicile (height from the ground in bush or tree, &c.,) as far as circumstances will allow, regard should be had to the natural habit of the birds which we wish to entice.

Fig. 150.

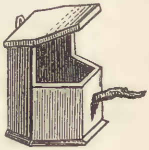


Fig. 151.

WINDOW GARDEN.—A correspondent of the COUNTRY GENTLEMAN describes a beautiful "show window" converted into a beautiful miniature garden, (fig. 152.) A shallow box 3 feet wide and 8 feet long, made of inch boards, is put together with white lead, and fills the space outside in front of the window, except a papered board interposed between the box and the front sash bar. A little fountain in the center plays over mossy plants and a water lily. The low mound bed, in the centre of which is the fountain, has a ring of stars of the silver-leaf sedum shining out from the green of this centre bed. The other beds have well chosen plants in plunged pots—begonias, lycopodiums, silver-edged geraniums, ferns, a fuchsia and a rose. The side-beds have little figures canopied with ivy. On brackets are two large goblets with pebbles and gold fish. There is rock-work, with mossy green. Some tall plants stand in the corners. The paths are white gravel and shells. The curb or edging is made of strips of window glass set on edge. The window fronts the north.

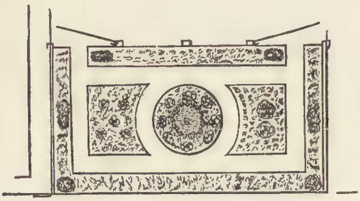


Fig. 152.—*Window Garden.*

TURFING LAWNS.—The first requisite is to level the bare surface, and render it as smooth as a floor. Too much pains cannot be taken for this purpose. The soil must be uniform; for if there are hard portions, lumps or patches, the earth will settle about them and leave an uneven surface, which is one of the worst things for a lawn. Then select a piece of very dense grass land, old pasture being usually the best, especially if it has been kept grazed short, which thickens the growth. Stretch a line and

cut down vertically with a spade which has been ground sharp. Then remove the line 15 or 18 inches and make another cut; and so on till enough has been laid out to begin with. This will give all the blocks of turf the same width, and greatly expedite the work of laying, as well as making it more perfect. Next provide a wide board, (an old smooth door answers well,) and commence taking up the blocks of turf, laying them grass side down on this board, the grass surface below being thus made perfectly straight. Then with a broad hoe, which has been ground sharp, scrape off all the earth down to the mass of grass roots (fig. 153), leaving the surface thus made perfectly smooth and even, and parallel with the inverted grass surface on the board below. This will be found quite easy, and requires but little time. The pieces of turf thus prepared are then laid in the wagon, barrow or other conveyance, and when the load is completed they are taken to the intended spot and laid on the prepared surface rapidly and evenly.

Fig. 153.—*Scraping Inverted Turf Blocks.*

Cheap Garden Roller.—Those who are deprived of a garden roller on account of its expense, can make one at little cost by the mode described in the Country Gentleman by J. I. Pease, and represented in the cut, (fig. 154.) Take a joint of stove-pipe, as large in diameter as you can find ready made, and then make two circles of inch board just large enough to fit closely within the ends which is easily done by measuring and striking the circle with a pair of compasses. Bore holes in the centres for a half-inch round iron rod. Set one of the circles in one end, secure it by hammering down the edges of the sheet-iron, insert the rod, set it on end, and fill it very compactly with dry sand, ramming down successive portions to make it solid. Then put the other circle in and secure it. Make a box frame as shown in the cut, and insert the handle for drawing it. The box may be used for a wheelbarrow, or for loading the roller heavier. Any carpenter or handy farmer can make it.

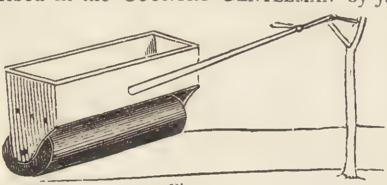


Fig. 154.

Plants in Sleeping Rooms.—Prof. Kedzie, of the Michigan Agricultural College, has made some interesting experiments in relation to the effect of flowers in sleeping and sick rooms, by analyzing the air. He finds no more carbonic acid in a greenhouse filled with 6,000 plants and shut closely, than in the free air outside. The air, in different experiments tried on air within, gave 4.11 and 4 of carbonic acid in 10,000 parts. At another time he found 3.80 and 3.94 parts of carbonic acid in 10,000. Out-door air contained about 4 parts. This proves that the carbonic acid is not increased by the plants and flowers. And yet plants often produce a deleterious influence in sick rooms, by the unpleasant odor which they yield, affecting the nerves unfavorably, in a manner similar to the effect produced by noise or the odor of decayed animals, where there is no increase of carbonic acid. On the other hand we have known sick persons greatly benefited by the refreshing and pleasant fragrance of flowers, operating favorably on the nervous system.

Flowers from Seed.—A writer in the Rural New-Yorker obtains the best and earliest plants from the seed accidentally scattered on the ground from the plants of the previous year's growth, taking care not to disturb the surface in spring till these plants are removed. He obtains a good supply of geraniums from his beds of the previous year, and in one instance had a geranium flower in four months from the seed. He also obtains in the same way an abundant supply of petunias, mignonnette, candytuft, dianthus, delphiniums, pansies, &c. We have been successful with some of these in the same way. This suggests the advantage of autumn sowing hardy flower seeds, with perhaps some protection.

Loosening Soil.—A correspondent of the Germantown Telegraph has proved the value of decaying roots and brush in new soils, by cutting two tons of brush, allowing it to decay one year, and then spreading it on half an acre of old land, and plowing in. On an adjoining half acre were applied two cords of barnyard manure. The result was that the corn planted on both pieces was nearly alike, being but slightly better on the manure. The effects of the manure lasted five years, and then disappeared; the effects of the brush continued ten years, keeping the soil loose like new land.

Fall Sowing of Flower Seeds.—James Vick says that the following kinds of flowers may be sown at any time before winter sets in, the seeds making an early start in spring. The soil should of course have good bottom drainage: Sweet alyssum, candytuft, centaurea, clarkia, larkspur, mignonnette, perennial pea, portulaca (sandy soil), sweet-pea. Other kinds, not quite so hardy, should be sown in September, so as to make plants before winter, as aquilegia, campanula, dianthus, hollyhock, poppy, sweetwilliam, lychnis, digitalis, &c.

Flower Beds.—A correspondent of the London Garden gives some valuable directions for forming combinations of flowers in beds, to produce effective results. One of his beds has a golden yew in the centre, and the

rest three shades of Drummond phlox, the carpet appearance of which is greatly increased by pegging the plants down twice. These again are surrounded with a belt of the pure white *Œnothera marginata*, and an outside edging of *Heuchera*. In another bed he employs *Campanula carpatica*, maintaining its bloom for four months by preventing it from seeding.

RAISING ROSE SEEDLINGS.—A correspondent of The Garden raises new roses easily from seed, by gathering the seed in autumn, planting very early the next spring, watering well the young plants with a fine rose watering pot. In October they are replanted under a south wall, and protected in winter by sticks and litter. (We should prefer evergreen branches.) They often bloom the first year, but two or three years are required to develop them well. It is hardly necessary to add that the seed should be planted in fine mould, not a half inch deep, and kept moist.

PANSIES.—A lady correspondent of the Rural New-Yorker sows choice varieties of the pansy early in autumn in boxes of four inches depth, placed on a sheltered side of the house. The boxes are filled to within half an inch of the top with rich earth, the seed sown, a little fine earth sifted over so as just to cover them, watered, and a pane of glass placed over to retain moisture. They are transplanted when the third leaf is out, and protected in winter.

HOUSE PLANTS—Taken up in autumn for window gardens may be kept more neatly in the pots by covering the surface of the soil in them with about an inch of clean, coarse sand. This prevents the sides of the pots from being defiled by the earth when they are watered, forms into a smooth, even surface, and prevents the formation of any crust from watering.

EARTH WORMS IN POTS.—A correspondent of Vick's Floral Guide, who had been much annoyed with earth worms in pots, succeeded in repelling them by watering with ten drops of carbolic acid added to a pint of water. "It operated like a charm, killed all the worms, and the plants began to improve at once."

CULTURE OF MAGNOLIA.—The London Garden says, on the authority of James Barnes, that the best soil for *Magnolia grandiflora* is a rich, friable, open, sandy loam, and if turfy and fibrous, so much the better. If the soil is heavy loam, add one-fourth peat, and a good portion of sharp sand. Mix well and expose to the sun and frost. Several different species of Magnolia have been found to grow with vigor in this artificial soil. An abundant bloom has been produced the following year, when the shoots have been pinched at the tips through the summer.

WEEDS—A PRACTICAL HINT.—Cultivators are gradually learning that there is a hard and an easy way to do things. We have often spoken of the importance of killing weeds before they came up, or before they have reached a tenth of an inch in height. It is then done with a single stroke of a steel rake if in the garden, or by the single passage of a light harrow on the field. It is often hard to beat this truth into the heads of laborers. We therefore tried it by marking the time required for each mode, by the

watch. A bed of flowers, containing eighty square feet, is raked once a week, whether the weeds appear or not. It requires four minutes for each raking; and for the entire months of May, June and July, forty-eight minutes. This leaves the bed perfectly clean and mellow, and the plants have the best possible chance. If the ground is full of foul seeds, they will come up in warm, moist, growing weather in one week, and once or twice their green points had just appeared when the weekly raking was given. In another bed of equal size, where this was omitted, they came up in a week, and in two more weeks were from three to six inches high—requiring over one hour to clear all out by hoe and hand. This must be repeated every three weeks, or four times in three months, requiring half a day's work to keep the weeds under for the three months, and even then doing it imperfectly.

PROTECTING YOUNG HEDGES.—The practice is common at the West of protecting newly set Osage hedges by covering late in autumn with a furrow slice from the plow. This is easily and evenly done if the ground on each side has been kept clean, smooth and mellow. The following mode of management by a successful planter (who has eight miles of excellent hedge,) by which the whole operation is rapidly performed, is given in the report of the farm committee of the Poweshiek County Agricultural Society, Iowa:

"He sets his hedge plants by spade; a man and boy can set near one mile a day. He cuts off the top to two inches of green stalk and cuts roots to five inches, sets soon as the ground is in order in spring, say about the first of May, or surely before corn planting, and his plants grow quick and strong; so, that by being trimmed or cut back close to the ground in the fall, and plowing a good furrow from each side right over row, all winter safely. In the spring run the plow along each side, to throw dirt back, run light harrow over the row and all is ready to grow again."

HOT WATER FOR INSECTS.—The Rural Carolinian adds its testimony to that of the Gardener's Monthly in favor of the safety of the use of water at a temperature of 120° for killing insects on plants. The plants must be quickly immersed, and taken out again as speedily as possible, and the water must be no hotter than the temperature mentioned. Some insects would not care for this dipping, but many would be killed.

EVERGREENS IN GRASS.—Prof. Beal makes the following remarks on this subject: "The groves of young trees set in numerous places on the lawn are generally thoroughly cultivated. In a few places the culture has been omitted. The contrast is often surprising. Where the soil is deep and rich, as at the foot of a hill, trees have done well, even in grass. A little space dug about trees doesn't seem to amount to much. Grass roots run down and under the trees, robbing them."

STREET TREES.—G. Ellwanger makes some excellent suggestions in the Rochester Express, on the importance of well planted streets in cities, which he thinks as essential to the beauty of a town as the architecture.

We regard tree planting as much more important than fine building, at the same time that it is less understood. Mr. E. mentions Columbia, S. C., as affording one of the best examples of judicious planting, either in this country or in Europe. The streets are about a hundred feet wide; with triple rows of oaks, of grand and perfect growth. When streets are narrow, trees of pyramidal, or upright growth, should be chosen, of which some of the cut-leaved weeping birches are good examples. Wider streets may have maples and horsechestnuts; while the widest of all may be planted with spreading elms. Mr. E. farther suggests that some particular tree be planted exclusively in one street, and another sort in another street; which would give a characteristic expression to each street; and he very justly objects to the common practice of trimming and mutilating trees year after year. If left nearly untouched, their full form will become developed, and for this reason the trees should not be crowded, but have abundance of room.

ITEMS IN FRUIT CULTURE.

SIMPLE TRAINING OF THE GRAPE.—E. S. Renwick of Essex county, N. J., gave in the COUNTRY GENTLEMAN an account of his mode of training grapes, which is simple, and appears to have important

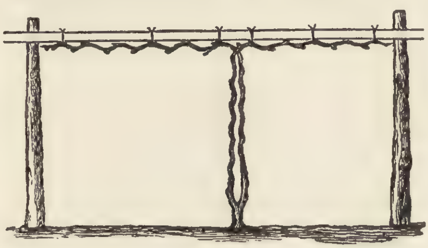


Fig. 155.

advantages. Fig. 155 represents the trellis with one horizontal bar or rail, five feet high, this bar being 2 by 3 inches. The vine trained as represented, has each arm hung from the rail and closely under it, by means of loops of galvanized wire, twisted above the rail. Sometimes the two upright branches of the vine are twisted together. The new shoots, when they start are trained up to opposite sides of the rail, as in fig. 156, to prevent the wind from blowing them all on one side. As the canes grow

Fig. 156.

larger, they droop and finally hang downwards. These are pruned on the spur system—the arms being renewed when necessary.

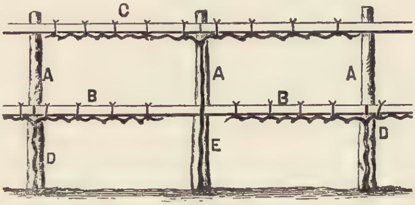


Fig. 157.

The advantages are,—pruning without stooping; the drooping retards length of growth and increases fruitfulness; and the labor is reduced.

A modification is shown in fig. 157, by which a double length of arm may be secured for free growers, the vines alternating at two different heights, on two rails.

Fumigating Greenhouses and Hot-Beds.—W. D. Philbrick describes, in the Country Gentleman, his apparatus for fumigating greenhouses and hot-beds, where lice often injure lettuce and other plants. A A little sheet-iron stove about 8 inches in diameter and 2 feet high has the cover pierced with several half-inch holes, and a false bottom four inches from the bottom, pierced with holes, answers for a grate. Just at the bottom is a sliding damper with an ash door. Fire is started with a few shavings; the stove is then crammed full with tobacco stems. The fire is controlled by partly covering the top. It is now all ready for fumigating the greenhouse, the operator retiring to escape the fœtid odor of the tobacco. To use it in a hot-bed a tight cover is placed on the top, the ash-pit closed, a hose or rubber pipe attached to the upper part of the stove, through which the smoke is driven under the slightly raised sash by a small bellows, with a nozzle inserted just under the grate—see fig. 158.

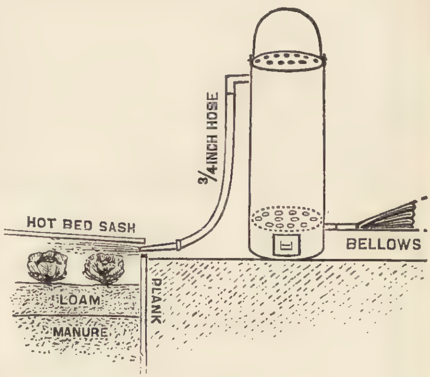


Fig. 158.

Baskets and Crates.—Wm. Parry of New-Jersey, gives special attention to the manufacture of baskets and crates, both for his own use and for the supply of others. The crates, for neatness, strength and convenience, are the best we have met with. He uses two kinds of baskets—one known as the Star pints, a modification of the Beecher basket, and

resembling fig. 159. The other is the quart Delaware basket, shown in fig. 161, and although less attractive in appearance, will pack more compactly in the crate. Although both baskets and crates are returned by

Fig. 159.—*Star Basket.*

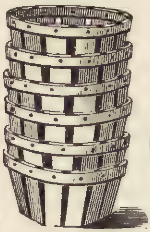


Fig. 160.—*The same nested.*

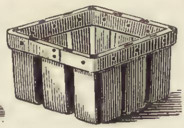


Fig. 161.—*Delaware Quart Basket.*

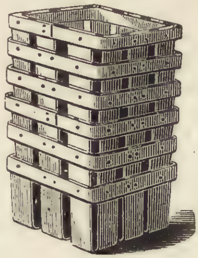


Fig. 162.—*The same nested.*

the venders as soon as emptied, and thus a continued repetition of their use is kept up, it is found necessary, for the short time required in transit, to keep 1,000 crates on hand and 60,000 baskets to do the marketing from this establishment.

Enriching Orchards.—To have large and fine apples and pears, an occasional, or when necessary, an annual top-dressing with manure, applied in autumn, is found to be just the thing. On soils naturally very rich this is not necessary. Where manure is scarce, green crops plowed under are next best. Clover has been used for this purpose with success. The seed should be sown on a clean mellow surface early in spring, and rolled or brushed in. It will make a fair growth the same season, and being allowed to remain on the ground, the second year it will afford a copious supply of enriching material by the first of June, which is as late as it will do to plow it under, and not cause too great a check to the trees. The only objection to this mode is the absence of cultivation through one whole season while the clover is growing. The diminution in the growth of the trees, if they are young, is apparent, but it is more than made up subsequently after the clover is plowed under. If the clover is allowed to grow two years, it will then afford a larger quantity of enriching matter, but this course should be adopted only for large trees or bearing orchards, which will not meet with so much check from the two clover years. We have adopted the practice, with good results, of top-dressing moderately with manure the autumn of the first year, all the slower growers, for a distance of ten feet or more on each side. This partly counteracts the exhaustion by the clover, gives it a stronger start, and affords these trees plenty of enriching matter when all is plowed under. Another, and a very good way, is to sow rye in the orchard in August; the young crop affording a fine green carpet when the fruit is gathered, and plowed under immediately afterwards it enriches the land. This can be repeated every year without any difficulty.

Where these different modes are not required for apple and standard pear trees, they will be useful and important for dwarfs.

PRUNING IN WINTER—Should be practiced only on hardy trees, such as the apple, and it should be performed to a moderate extent at a time on orchard trees. We never recommend heavy cutting away. It is better to allow a tree to remain a little deformed, lop-sided, or dense-headed, for a year or two, till the work can be accomplished gradually. (These remarks do not apply to young nursery trees.) A European cultivator has recently given in substance the following good directions: In sawing off a limb, set the saw below and cut up part way, and then cut from above to meet it. This prevents the limb from tearing away the bark in falling. Or, a better way—saw off the limb freely, leaving a stump about a foot long. Then holding this stump in the left hand, cut off neatly and carefully. Cut as closely as may be done without making too large a wound; like the skillful surgeon, save skin. Never leave a projecting stump which will disfigure the tree for many years before it is grown over. Use sharp tools of the best steel; thus saving much labor, leaving a smooth face, and cutting more accurately just where you want to. Nothing is better than one or two coats of oil-paint for covering the wound; and if it is ash or slate color, or having the same shade as the bark, the orchard will not appear defaced by the operation.

CULTIVATING ORCHARDS.—Suel Foster of Muscatine, Iowa, who has cultivated fruit for more than 20 years, and has a fine specimen orchard at that place, says: "I know of no orchard, either on my own premises nor have I seen or heard of one in this county, that is so productive as this specimen orchard. I have kept it under the plow all the time, usually with a crop of potatoes or corn; no manure. Most of my orchards have been plowed until they came into bearing, then seeded to clover, and when the timothy and blue grass came in, then plowed again. I am now fully satisfied that the orchard should be plowed every year; the less grass the better. Plow in late fall and early spring."

FRUITS FOR THE SOUTH.—The Fruit Committee of the Atlanta Pomological Society, recommend, in the Rural Southerner, the following list of fruits as adapted to culture in Georgia:

Strawberries.—Wilson's Albany, Charles Downing, Triomphe de Gand.
Raspberries.—Mammoth Cluster, Virginia Blackcap, Doolittle.
Blackberries.—Georgia Mammoth, Kittatinny.
Mulberries.—Hick's Ever-bearing.

Apples.—Yellow May, Red Astrachan, Red June, Yellow June, Early Harvest, Rhodes' Orange, Julian, Yellow Horse, Farrar's Summer, Taunton, Hamilton, Kentucky Queen, Mangum, Buncombe, Golden Russet, Oconee Greening, Yellow English, Nickajack, Yates, Shockley.

Peaches.—Hale's Early, Early Tillotson, Amelia, Early Admirable, Cole's Early Red, Chinese Cling, George IV, Georgia Cling, Van Zandt's Superb, Old Mixon Cling, Old Mixon Free, Stump the World, Orange

Cling, Pace or Columbia, Susquehanna, Heath Free, White English, Tippecanoe, Picquet's Late, Bustain's October.

Pears.—Doyenne d'Ete, Beurre Giffard, Bloodgood, Stirling, Selleck, Kirtland, Clapp's Favorite, Duchesse de Berry d'Ete, Bartlett, Belle Lucrative, St. Michael Archange, Flemish Beauty, White Doyenne, Beurre Superfin, Howell, Duchesse d'Angouleme, Louise Bonne de Jersey, Colmar Van Mons, Seckel, Beurre d'Anjou, Buffum, Beurre Clairgeau, Winter Nelis, Lawrence and Easter Beurre.

Grapes.—For the table—Concord, Ives and Hartford; and for wine—Scuppernong, Norton's Virginia Seedling; Clinton (amateur), Delaware, Goethe, Rogers' 6, 43, Salem, Wilder, Martha, Maxtawney, Perkins and Diana.

SOUTHERN APPLES.—The Rural Carolinian gives the following list of sorts which have been most generally approved—in which, of course, there may be some variation in different localities: *For Summer*—Early May, Early Harvest, Red Astrachan, Summer Pearmain, Early Joe, Sweet Bough, Horse, William's Favorite, Early Red Margaret, Strawberry, Maiden's Blush, Summer Rose. *For Autumn*—Bonum, Disharoon, Equinetely, Golden Russet, Hoover, Taunton, Eutaw and Smokehouse. *For Winter*—Shockley, Carolina Greening, Buncombe, Buff, Vandevere, Lady Apple, Limbertwig, Hall, Clark's Pearmain, Stevenson's Winter, Hockett's Sweet, Faust's Winter.

DWARF APPLES.—G. Ellwanger of Rochester, whose views are worthy of entire confidence, gives the following list of apples best adapted for dwarfs: *Summer*—Astrachan, Early Harvest, Keswick Codlin, Sweet Bough. *Autumn*—Gravenstein, Oldenburgh, St. Lawrence, Chenango Strawberry. *Winter*—Wagener, Baldwin, Melon, Northern Spy, Twenty Ounce, Red Canada, Yellow Bellflower, Esopus Spitzenburgh and Lady Apple.

HARDY APPLES.—The Minnesota Horticultural Society recommends through a committee, the following three apples as worthy of general cultivation, the result of many observations on their endurance of the coldest winters, namely, Duchess of Oldenburgh (although killed in some localities), Tetofsky, and Stewart's Sweet (very hardy), while the variety known as the Wealthy, with some objection, was recommended for trial. The following were next in hardiness, namely, Fameuse, a general favorite; Walbridge, approved as far as known; St. Lawrence and Tallman Sweet. Pears were badly injured, and none were recommended.

APPLES FOR A PRAIRIE ORCHARD.—The Prairie Farmer gives the following list, with the good suggestion to revise from the experience of fruit-growers in each neighborhood: Five Carolina Red June, 10 Sops of Wine, 5 Early Pennock, 5 Jersey Sweet, 10 Fameuse, 10 Stannard, 10 Jonathan, 5 Tallman Sweet, 10 Ben Davis, 10 Winesap, 10 Willow Twig, 10 Rawle's Janet, 5 Gilpin; thirteen sorts; 105 trees.

MARKET APPLES IN CANADA.—At a late meeting of the Ontario Hor-

ticultural Society, Charles Lee of Hamilton said that he would plant his entire orchard with the Rhode-Island Greening ; he finds this most profitable. The Northern Spy and Roxbury Russet do well, and all better than the Baldwin.

Market Apples in Missouri.—The Missouri Horticultural Society voted three sorts as most profitable, namely, Ben Davis, Wine Sap and Lawver—the latter a beautiful and showy apple of very moderate quality.

A Profitable Pear Orchard.—The Agricultural Report gives a statement from L. & A. B. Rathbone of Genesee Co., N. Y., of their experiment of a ten-acre orchard of 4,000 dwarf pears, three-fourths of which are Duchesse d'Angouleme, and the rest Louise Bonne of Jersey, Anjou, and Vicar of Winkfield, set out ten years ago—400 to the acre, and ten feet apart each way. Their sales have been as follow, in each successive year, beginning after four years from setting out:—$100, $230, $110, $1,338, $2,250, $5,530—total, $9,458—the last named year the average being $553 per acre. The locality and soil and good management, resulted in this success, the trees being well pruned, and receiving medium cultivation without manure, except that in June, 1873, eighty bushels to the acre of wood ashes and lime were applied, which application was probably one reason for the double sales which followed.

Successful Dwarf Pears.—T. G. Yeomans of Walworth, N. Y., states, in the Gardener's Monthly that he had in the year 1873, a crop of over 800 barrels of pears on his dwarf trees, of which the waste fruit amounted to less than 20 bushels. The next year he had over 500 barrels. The trees have been more than 20 years planted, and have now become so deeply rooted that standing in grass with mulching and manuring, they maintain their vigor.

The Value of a Name.—Dr. Sylvester had found the Napoleon a good market pear, and at the time of tho Franco-Prussian war sent several half-barrels to New-York, marked "Napoleon." No one purchased them. One morning the consignee came down and erased this name, and substituted "Bismarck." They sold readily, and for some days afterwards he had frequent calls for more of those "Bismarcks." An incident with a similar result occured in our knowledge many years ago, when the Virgalieu was the most popular market pear grown in Western New-York. A shipper in Buffalo sent several barrels marked with this name; but thinking that the fine French name would sound better, he marked the rest "White Doyenne." Although identically the same, and grown in the same orchard, and possibly in some instances on the same tree, the White Doyennes brought only half the price of the Virgalieus.

Shortening Back Peach Trees.—President Dyckman of South Haven, (whose good management of the Peach tree is proved by the fact that the has sold twenty thousand dollars' worth of fruit in a single season), discards entirely the practice of shortening-in annually the one-year shoots. He says: "We cut back only to keep the head of the tree in proportion,

and within reaching distance of a seven feet ladder. Any tendency to grow long, straggling branches, is overcome by thinning the branches to the point of keeping an open, well-ventilated top." This treatment is fully described on page 94 of the American Fruit Culturist. To prevent a mass of feeble growth from filling the top, much summer pruning is found necessary by Mr. Dyckman. But nothing is regarded by him as more important for the health and vigor of the trees, but especially for fine, large fruit, and high prices, than thinning the crop early in summer.

MARKET PEACHES.—President Dyckman, speaking for the neighborhood of South Haven, Michigan, says that Early and Late Crawford outsell all competitors in market; they are hardy, free from leaf-curl, continue to ripen long, and ship well. The Barnard has also been found an admirable peach for market, slightly later than Early Crawford. Jacques' Rareripe and Oldmixon Freestone have proved hardy, productive and valuable.

KEEPING GRAPES.—The first requisite is to have well grown and well-ripened grapes. If too green, they will shrink; or in a moist apartment, they will rot. If over-ripe, they will decay sooner. Next place them in a cool apartment, nearly or quite down to freezing. The rich juice of well ripened grapes will keep them from harm if several degrees below the freezing point. Thirdly, pack in some dry, soft substance. Dry cotton batting will do, but baked sawdust from some soft wood that will not impart a bad taste to them, will answer better. Maple leaves, placed in alternating layers with the bunches, have done well. It is important that they be put up when not covered with any moisture, but well dried, with all defective berries removed.

ERRORS ABOUT GRAFTING.—We often see extravagant statements by which the ignorant are imposed upon. Some years ago a story went the rounds of the newspapers that if the peach were grafted on the willow, the fruit would have no stones. A similarity in the shape of the leaves led some to believe that grafting would succeed, though the two trees are far separated in affinity. The statement was true that there would be no stones, for there would be neither peaches, stems nor leaves. Some years ago we saw a "professional" grafter inserting scions of the chestnut into trees of the horsechestnut. A similarity in the name, and a fancied resemblance of the nuts, had suggested the attempt. The owner called to us, "Mr. T., can we graft the common chestnut into the horsechestnut?" "Certainly," we replied. "Will they be pretty sure to grow?" "Not at all—they will never grow—belonging, as they do, to widely separated natural orders." The dead grafts remaining showed the result.

ECONOMICAL STRAWBERRY CULTURE.—A very successful strawberry raiser near Cincinnati, gives the following as the essential requisites for the best success, and consequently the most economical mode of management: 1. Clean, rich soil; one that is entirely free from weeds and its seeds, which has been subjected to perfectly clean culture for a year

previously, either with a hoed crop or summer fallow. Buckwheat is found to be a good crop to precede strawberries. 2. Planting in spring, not in summer or autumn, and after the severe frosts have past, as they sometimes at that place badly injure newly set plants. 3. Selecting good plants, of the previous year's growth, that have not borne fruit, and keeping flower buds cut off so as not to bear the first year. The plants are 15 inches apart, in rows 3 feet asunder. 4. Horse-power for cultivating thoroughly, with small plow, cultivator, shovel plow, small round-toothed harrow, hoe, &c. 5. Plant in *clusters* in the row (not matted rows) with runners cut off. 6. Mulching with oats straw late in autumn, and raking it away into the spaces in spring; and not disturbing the soil till after the fruit is gathered. The first crop is always largest and best, and hence only one crop is taken—which also obviates more laborious subsequent weeding. Wilson's is exclusively planted.

STRAWBERRIES AND RASPBERRIES.—Wm. Parry of New-Jersey, who has about a hundred acres in small fruits, finds the following the best strawberries, which are named in the order of ripening: New-Jersey Scarlet French, Wilson's Albany, Seth Boyden, Charles Downing, Monarch of the West, Dr. Warder, Black Defiance, Col. Cheney, Late Prolific, Kissena, and Kentucky. These extend the strawberry season through several weeks. The Monarch of the West is the largest; specimens often measuring five inches in circumference. The Herstine proves to be a hardy raspberry, of large size and fine flavor. The Mammoth Cluster is also very valuable.

BLACKBERRIES.—Wm. Parry gives in substance the following directions for planting and managing blackberries: "Manure the land about as for wheat or other farm crops, plow deeply, harrow well, draw small furrows 8 feet apart one way and 3 feet the other; then set out plants at each crossing, or 1,815 per acre. Plant corn, potatoes, melons, &c., between, and they will yield more than the same rows in the common mode, as they have more room. The cultivation of both is performed together. When fully established the culture is very easy. Shorten the strong growing canes. Manure as often as the intermediate crops require. For fall planting, do the work in October and November, preparing the ground well beforehand."

BLACKBERRY PLANTATIONS.—The Fruit Recorder prefers to set out blackberries in autumn, as the roots become well established and start early in spring. The rows are 8 feet apart, and the plants 3 feet in the row; and after setting, the plow is passed on each side, throwing two furrows together over the roots, which carry off the surplus water and protect from heaving by frost. In early spring, a harrow is run across the ridges to level them down.

MARKET RASPBERRIES.—The American Rural Home says that the berry of highest promise in the vicinity of Rochester is the Franconia, and recommends this sort to any person about to plant an acre, as possessing

size, beauty, *firmness* and productiveness, above any other sort. A rich soil is recommended ; the richer the better.

FRANCONIA RASPBERRY.—The Rural Home gives the results of the cultivation of this raspberry by Mr. Pillow, a neighbor, who has four acres, from which he marketed the past season in Rochester and Buffalo, 10,234 quarts, the receipts from which were $1,870, or a little more than 18 cents per quart. The product per acre was about 80 bushels, and the gross receipts per acre $467—a fair medium result. The soil is clay loam, well manured and well cultivated, and the canes are laid down by covering the tips for winter.

VARIETIES OF CURRANTS.—We condense the following from a paper by A. S. Fuller—good authority on the subject: The Cherry currant is the largest red sort; fruit good, but not equal to some smaller varieties in quality ; Versailles so much like it that few can see any difference. Next, he names Fertile de Pallnau, intermediate between Cherry and old Red Dutch; the latter he would not omit from any collection however small. Buist's Long Bunched Red is similar. The White Dutch and White Grape are the best white varieties. White Provence scarcely differs in its fruit from White Dutch; and Dana's White closely resembles White Grape. Victoria is a long-bunched late currant; Prince Albert is also late, with short bunches, and of no great value. Gloire des Sablons is a worthless curiosity. Red Provence is very late, and of no value. La Hative and La Fertile are abbreviated editions of Cherry, not so good.

COTTON CLOTH FOR HOT-BEDS.—J. B. Root, a successful market gardener, states in the Fruit Recorder that he uses cotton cloth at a cost of one-eighth that of glass for more than three-fourths of his hot-beds, and although not so good for the earliest beds, it is preferred for all later ones. It is prepared by making the cloth covers a few inches wider and longer than the frame, hemmed and provided with small curtain rings 15 inches apart around the border, stoutly sewed on; and by hooking over nails, the cloth is drawn air-tight over the frame. One quart of linseed oil, one one ounce of pulverized sugar of lead, and four ounces, of pulverized rosin, are heated, dissolved and thoroughly mixed in an iron kettle, and one coat applied while hot to the upper side of the cloth. This renders it tight and nearly transparent.

ASSORTING FRUIT.—At a recent fruit-growers' meeting in Illinois, J. M, Cyrus, commission merchant, said that dishonest packing was the great trouble in the sale of fruit, as well as in other farm products, adding that if at least one-third of the poorest were thrown out and left at home, and only two thirds of the best, well put up, with the owner's name in broad, plain letters, they would bring more money than the whole, and the cost of freight, package, &c., on all this worthless stuff avoided.

VALUE OF THE FRUIT CROP.—F. R. Elliott has made a careful esti mate from such materials as he could procure, of the value of the different fruit crops of the Union, not including the fruit used for home consump-

tion by the owners of orchards and gardens, and he makes about $45,000,000 worth. New-York stands highest—$7,000,000; Ohio, $6,900,000; New-England States, $6,000,000; Illinois, $4,500,000; and Indiana, Michigan and Pennsylvania, each about $3,000,000. Delaware is estimated at $1,500,000.

ORCHARDS OF THE UNITED STATES.—It is a fair estimate that the orchards of this country occupy 500,000 acres, and contain 20,000,000 trees, in various stages of growth. If all were well managed, what an ample provision they would afford for the health and comfort of our people!

FRUIT AND HEALTH.—Dr. Hunt said, at a meeting of the Warsaw Horticultural Society, that "an absence of fruits implied doctors' bills." We have urged for many years the importance of a regular supply of ripe fruit to prevent disease, and insisted that the best medicine chest which an emigrating family could carry to a newly settled country would be a box of early bearing fruit trees, currant, gooseberry and raspberry bushes, and strawberry plants. We knew a family who moved west, and took with them a very large supply of dried fruit, which lasted them through the first summer. None of them were sick, although disease prevailed all about them that year; but the next year, with more comforts and less privations, but with no fruit, they suffered much from sickness. Other western residents have told us that so long as they could have ripe fruit, they have been free from all diseases resulting from malaria.

THE VEGETABLE GARDEN.

TOMATOES.—At a meeting of the Alton (Ill.) Horticultural Society, Capt. Hollister gave an account of his successful method of raising tomatoes, which is briefly as follows: The seeds are sown in a hot-bed, thickly in drills. After the plants are up, they are root pruned by running a knife between the rows. When rough leaves appear, they are transplanted to another bed, two or three inches apart. If they become "drawn," the roots are doubled up on the stem, and thus set out in a warm bed. The knife is run repeatedly between the rows. When the plants begin to crowd, they are transplanted again into a colder bed, with 8 or 10 inches of earth. Thus they grow strong and stocky. The weeds are of course, not allowed to grow at all, and the plants are well watered. The knife being used as often as once a week, the roots become short and numerous, and hold the soil when they are set out. Capt. H. thus secures a ripe crop by the first of July, at Alton, lat. 39°.

REDUCING BONES FOR GARDENS.—It is not often that bones can be collected on the farm in sufficient quantity for field crops, but every man who has a garden can make a little excellent manure by saving those

within his reach. It is useless to recommend converting them into home-made superphosphate by using sulphuric acid; the difficulty and trouble of procuring the acid away from cities, and the care and experience required to use it, are sufficient objections. There are, however, two modes of reducing the bones, which every gardener may easily adopt. One is to place them in thin layers in a fermenting heap of manure, which, if they are previously broken, will soften them enough to cause crumbling after the lapse of weeks, when the heap is worked over. Even a common hot-bed will do, if the bones are first broken into fragments. The other mode is to boil them, as follows: Mix them in a large kettle with wood ashes; and to make the ashes caustic, add about a peck of fresh lime to each barrel of bones. Saturate and cover the ashes well with water, then apply heat, for say twenty-four hours, or during the day for two successive days. All the bones by this time, except the very hardest parts, will be so reduced as to be easily pulverized, being in a pasty condition, suitable for placing in layers in making the compost heap. Another day's boiling will reduce the remainder of the hard bones.

J. B. Root describes the following method, in the Western Farmer: The bones are first broken coarsely with a heavy axe or sledge, and then placed in a concave block and crushed with a twenty pound weight working on a double spring pole. They are then put in thin alternating layers with manure, and the whole covered with two or three inches of soil. The layers of the crushed bones are not over half an inch thick; the layers of stable manure about six inches.

Green-Crop Manure.—The same practical gardener says the best and cheapest manure for the garden is obtained by clearing his earlier crops in September, and then sowing rye thickly, turning it under when a foot and a half high the following spring. He then plants at once on this inverted sod, which rots in a few weeks, keeps the soil moist in the severest drouths, and is worth five times its cost spent in buying manure.

Depth to Plant Peas.—F. R. Elliott gives an account in the Gardener's Monthly of some experiments performed fifteen years ago to determine the best depth to plant peas. Buried 1 and 2 inches deep, they came up soon, bore early, but did not last long. At 3 and 4 inches in depth they came up three or four days later, did not bear quite so early, but gave a heavier crop and continued for a longer time. At 5 and 6 inches depth they appeared two or three days later, and grew about as vigorously as the others, and continued still later. At 8 and 10 inches they were long in coming up, and did not produce so well. A few straggling feeble plants came up from 12 inch planting. Mr. E. thinks about 4 inches the most profitable depth in strong soils, and a little more in light soils. We may add that in 1873 we made a series of experiments to determine the effect of time on the germinating powers of the pea—varying from one to five-year-old seed. The oldest seed was nearly a week longer in coming up than the fresh seed, but in other respects little difference was observed,

although the plants from the old seed were at first hardly so vigorous. Two-year seed was about two days later in appearing than fresh seed. Those who desire peas as early as possible, will therefore select fresh seed.

STIRRING THE SOIL.—A very successful Illinois market gardener mentions some experiments in the Fruit Recorder, showing the importance of stirring the soil as a preventive of injury from drouth. He puts among some of his crops a horse cultivator for every four acres, and keeps it going early in summer. The effect is always striking. The soil, he says, becomes "splendidly loose." In some instances the crop has been doubled. Nothing keeps the moisture better in drouth. The result has been particularly satisfactory with melons, tomatoes, cucumbers, and cabbages. For onions he has found nothing equal to manure for retaining moisture in the soil.

CABBAGE WORM.—After trying various remedies, we have found boiling-hot water from a watering pot the simplest, easiest, cleanest and most effectual mode for destroying the cabbage worm. If applied quickly and not too long on the leaves, it produces no injury. It is easily repeated as occasion requires.

BEANS WITHOUT POLES.—J. B. Root, Rockford, Ill., pinches back his pole beans before they are three feet high. The side shoots are thrown out, which, clinging to one another, form a self-support. A single lath is sufficient to hold up each hill. The blossoms are developed profusely, and the crop is about one-half larger.

MENDING WATERING-POTS.—Tin watering-pots much used in the garden often become rusted at the lower corners, and begin to leak. It is not necessary yet to throw them aside, as the holes may be effectually stopped without going to the tinker's, by covering them inside with a small piece of linen dipped in copal varnish, the tin being previously thoroughly dried. When the varnish hardens by drying, they are perfectly water-tight.

GARDENING FOR INVALIDS.—A young lady of our acquaintance, whose health seemed hopelessly broken by teaching and study, restored it during the course of a year by renting a piece of land for a small market garden. She could work for a very short time each day at first, but gradually gained on the time, till she became comparatively robust. Although away from town or village, she sold her vegetables for over a hundred dollars that season. Peter Henderson gives another example, of a gentleman who had close sedentary occupation in New-York, until he became a severe sufferer from dyspepsia. He bought a cottage over in New-Jersey, with a lot 50 by 150 feet. He was amazed when work for *his own hands* on this lot was proposed to him. But he resolved to try; he began gradually. He worked from six to half past seven in the morning. Before long his health improved, and he became, instead of a pallid and slender man, strong, healthy, and robust. For the next six years his health never failed him. Although he made some mistakes at first, he soon became successful as a gardener, and supplied his family with an abundance of fresh vegetables.

KEEPING APPLES FOR DAILY USE.

THE QUESTION IS OFTEN ASKED, what is the best way to keep apples for common family use? We have found central shelves in an apartment set off or devoted to this purpose, the most convenient. The apples are spread on these shelves, only a few inches deep, so that they may be readily examined or picked over as fast as decay commences on any specimens.

It is very important that the apples be kept as cool as practicable after gathering in autumn, and before the freezing weather of winter arrives. For this purpose they are placed on the floor of an outhouse facing the north, and allowed to remain there till about the time that freezing weather commences, when they are removed to the shelves of the fruit room in the basement of the house. This fruit room (which is about ten feet wide and

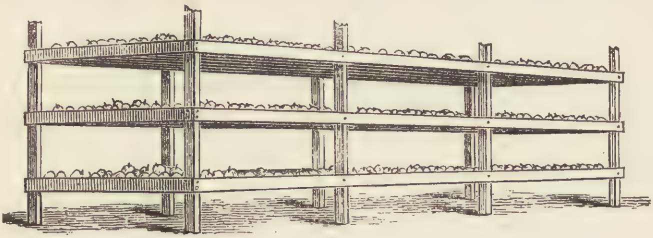


Fig. 163.—*Full Length View of Apple Shelves.*

thirty feet long) is separated from the rest of the basement by an 8-inch brick wall, and has a cement bottom to keep the air dry enough. Windows for ventilation are hung on hinges, so that they may be opened or closed to any desired degree, for the regulation of the temperature by the thermometer. The nearer this temperature is to freezing, the better the fruit will keep. When the weather is warm outside, the windows are closed to exclude the warm air; when colder, they are opened sufficiently to admit cool air and keep down the temperature.

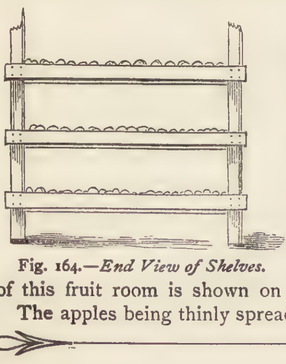


Fig. 164.—*End View of Shelves.*

Fig. 163 is a view of this series of shelves, wide enough apart to allow the attendant to pick the apples freely. Fig. 164 is an end view of the same. A plan of this fruit room is given on page 260 of RURAL AFFAIRS, vol. V; and a plan of the whole cellar, showing the position of this fruit room is shown on page 198, vol. VII.

The apples being thinly spread on the shelves, any decaying specimens

are readily detected and removed, care being taken *not to disturb or tumble over the sound apples which remain.* An examination every few weeks during winter and spring will keep the supply clear of rotten apples.

Among the advantages of this mode are the readiness with which the specimens which will not keep are separated from the others, and only long keepers allowed to remain. When fruit is kept headed up in barrels, which is a common mode, this selection and separation cannot be made; and while they keep better thus excluded from the air so long as all remain sound, the commencement of decay in a few specimens soon spoils all the rest.

A little practice will enable the attendant to remove those specimens which will not keep, even before decay begins; and by going over the shelves several times during winter and spring, none but sound, long keepers are left.

As warm weather approaches, and it becomes more difficult to keep the apartment as cold as may be desirable for the fruit, a portion of the soundest and hardest are selected and placed in shallow boxes and shoved under the lower shelf, on the bottom of the cellar. The cold cellar bottom keeps them at a low temperature, and the shelf above serves as a cover, to prevent air currents. In this way we have fresh specimens of such fruits as the Baldwin and Rhode Island Greening at the middle of June, and we sometimes keep fine, hard, fresh Greenings into the month of July.

The three leading requisites for success are: 1. Placing the apples in a cool outhouse in autumn till freezing weather; 2. Removal of decaying specimens from the shelves; 3. Keeping the temperature as low as practicable without freezing, by a proper adjustment of the hanging windows.

RURAL AND DOMESTIC ECONOMY.

WORK FOR RAINY DAYS.—We have found a great advantage in keeping a list of jobs to be done on rainy days, always hanging up in the workshop. It is written on stiff, white pasteboard, with a large, round, distinct hand, so that every hired man can read it. All the men are instructed, whenever a rain comes on, instead of standing idle under sheds or in barns, to repair at once to the workshop, and commence on such work as may be named first on the list, or may have a pencil mark drawn under it, or which they may think needs doing first, according to the circumstances of the case. The following is a sample of a list of this kind:

1. Clean and sweep floors of outhouses, barns, shop, &c.

2. Clean all tools, harrows, plows, cultivators, wagons, hoes, spades, and everything you can think of.

3. Put all tools accurately in their allotted places, if any have been left out.

4. Oil with petroleum all tools made of wood or partly wood, as plows, harrows, wagons, rakes, spades, &c.

5. Clean and oil harness.

6. Sprout or assort potatoes. Assort apples in winter or spring.

7. Grind hoes and spades.

8. Clean hen-house and whitewash it.

9. Shell corn.

During wet weather, when not raining, repair board and rail fences, gates, &c.; pile manure, scrape barnyard, spade grass around trees, &c.

A Durable Roof.—We make excellent shingle roofs in the following way: Lay roofing-felt (tarred paper) on the roof boards; dip the shingles into a tub of crude petroleum, so as to soak them through, and then lay them on the roof in the usual way. The felt will prevent all leakage, and the shingles will never decay nor become covered with moss. They will not affect the rain-water after a few weeks, and will be as good as slate. They will not catch fire so soon as without the oil, as this prevents the forming of any fuzz on the surface.

Durable Painting.—The outside of wooden buildings may be painted in the following way, and rendered incomparably more durable: First apply crude petroleum copiously with a whitewash brush, or any coarse brush; then in a few days give the building a coat of Averill paint, which adheres better than any other paint, and becomes harder. The oil in the pores of the wood, and the paint outside do the work perfectly.

Arsenic in Wall Paper.—All wall paper with bright green or delicate purple figures, may be suspected of having been colored with arsenic, which renders living in the rooms dangerous to the health, and many are ruined in health in this way. To detect the arsenic, pour a little liquid ammonia on the colored paper, when, if a blue precipitate forms, you may be pretty sure of the presence of the poison. To render the test certain, pour off the clear liquid from the blue precipitate, on a piece of glass or a dish, and drop in a crystal of nitrate of silver. If a yellow border forms around the crystal, you may be sure of the presence of arsenic; and avoid such paper.

Petroleum—In its crude state, is a very cheap oil, and penetrating the pores of wood, has a strong preservative power, converting soft, perishable woods to the durability of red cedar. Nothing is improved more than *farm baskets*. Fill a tub with the oil, and then dip the baskets in it, and they will no longer become wet, nor decay. Serve all small wooden tools, as rakes, hoe-handles below, coarse water-pails, &c., in the same way. The cost of the oil for the baskets is almost nothing. Large wooden tools, wagons, harrows, plows, &c., may be soaked with it by applying with a whitewash brush.

Lightning Rods are often supported with iron staples holding a

small ring of glass. This is worse than useless, as a small electric charge will jump the glass, and the iron will conduct it into the building; and besides, as soon as the glass is wet by the rain, it is a good conductor. A wooden support with a hole bored through for the rod, is immeasurably better. Never buy a lightning rod of a peddler, but get a blacksmith to make it, by welding rods together, long enough, with a few sharp iron points above, to run well above the building, and several feet into the soil below. You need no silver points to the top.

CHARCOAL A GOOD MEDICINE.—One of the best medicines for men and domestic animals is pulverized charcoal. Take the burning coals from the woodfire, and pound them to powder in a mortar, which will give it fresh and sweet. Almost any derangement of the stomach is set right by it. A teaspoon slightly rounded up, (mixed with water,) is enough for a grown person —less for a child, and a heaped teaspoon for every hundred pounds of any animal. For bloated animals it has a wonderful effect. The great advantage is, it can never do any harm, but if given too largely, it has a cathartic effect. The best *food* is scalded shorts, especially if the animal has caught cold.

TO MAKE FARMING PROFITABLE.—Prefer a small farm, free from debt, and with surplus capital to use, to a large one heavily mortgaged, with weeds, poor soils, poor fences, and thin crops. Lay out in good fields for rotation; have sufficient farm buildings for the shelter of crops and animals; get the best animals and implements to be had at a moderate price; arrange work in a system; continually improve the land by draining, manuring and rotation; and use care and diligence with energy.

CHEAP PAINTS FOR EXPERIMENTING.—The following paints and washes for outbuildings are strongly recommended, and by trying them side by side, valuable information may be derived after several years: Slack clean, white, fresh lime to a powder, and then mix it with water; add a pound of sulphate of zinc to every peck of the lime, and half a pound of salt. It may be made cream color by adding yellow ochre; fawn color by umber; and grey by lampblack. Another—water lime, 1 peck; freshly slacked lime, 1 peck; yellow ochre and burnt umber, each 2 lbs.; the whole dissolved in water. Another—water lime, with as much fine, clean sand as can be mixed with it in water for applying with a brush.

SIZE OF CISTERNS.—These should be much larger than commonly made, as much water is wasted. About 3 feet of rain falls yearly; say 7 inches for two months. A cistern should hold two months of rain which from the roof of a barn 30 by 60 feet would be 250 barrels. To determine the required size for a cistern of any capacity, the following rule may be used: Square the diameter in inches and multiply the square by the decimal .0034, which will give the gallons for one inch in depth. Multiply this by the depth, and divide by 31½, and the quotient will be the barrels of content. Examples:—A cistern 5 feet in diameter holds 23 barrels; one 8 feet in diameter and 6 feet deep holds 69 barrels; 10 feet in diameter and 8 feet deep holds 150 barrels.

Durability of Posts.—White oak posts are said to last 10 or 12 years; blackwalnut nearly the same; and locust 20 years or more. But everything depends on soil and subsoil. If these are gravel, and the drainage below perfect, they will last many times longer than if often water soaked. In fact, in gravel or finely broken stone, always dry, posts will last beyond estimate, for they never get wet within.

To Make Carriages Last.—Keep them clean. Dirt spoils the paint, and rain enters; the wood cracks, warps and decays. Dirt on the hubs enters them, and grinds and wears out the axles. When they are greased or oiled, scrape and wipe off the axles perfectly clean, so as not to mix grit with the oil. Keep the nuts well screwed up, for which purpose examine them often.

Weekly Inspections.—Every man should make a rule to go over all his things once a week, see what is out of order, and put all right. If anything is broken, have it repaired; if anything is exposed, place it in shelter; if hoops are loose, tighten them; if boards are off fences or buildings, nail them on; if hinges creak, grease them, &c.

Pumps Freezing.—It is common to have a small hole in the pump tube a few feet below the exposed portions, to let off the water and prevent its freezing. Where this provision has not been made, the same result may be reached by placing a small nail, tack or small wire just under one edge of the leather valve which retains the water, sinking it partly into the leather to hold it. This will cause a small leak, and the water will not remain long enough to freeze. It is needed only in winter.

Leaky Roofs—Made so by the shrinking of boards and shingles, especially about chimneys, may be effectually stopped by a thick cement made by mixing fine, clean sand with white lead paint. Or fine sand mixed with tar makes a perfect and durable cement, which freezing and thawing will have no influence upon, but it should not be exposed to sunshine.

The Tape-Line.—Every farmer should know the size of all his fields, how much seed they need, what they yield, &c. A measure always at hand, and properly used, will be to him as important as a compass to the mariner.

Underdraining has these advantages: The soil may be worked at all times; it holds like a sponge the surplus water, and gives it off again in drouth; it assists pulverization by preventing the particles from being glued together; it facilitates the thorough mixture of manure; it takes off cold and chilling water, and gives a warm soil; the porosity it imparts prevents freezing in winter; it lessens the tendency of frost at the surface it allows much earlier plowing and working in spring and later in autumn, and thus greatly lengthens the seasons.

Laying Out Farms.—Much depends on proper arrangement. The barns should be near the centre, for drawing in grain and drawing out manure. A good, hard, level road or lane should connect every field with

the buildings. When practicable, the fields should be nearly square, to economize fencing. Hills should be brought as near the centre of fields as may be, to enable the plow to pass around them and throw the earth downwards.

MEASURING POLES, of different lengths, should always be at hand. The pocket rule, three inches long and opening to twelve, will be convenient almost every day. Beside this, which the farmer carries in his pocket, he should have a yard stick, one about six feet long for many purposes, one ten feet, and another sixteen and one-half, or one rod. The last, if of light wood, will often be useful in measuring off small lots of land. To be as light as possible, they should be thickest in the middle, and taper each way; and they should be properly graduated.

PLOWING HEADLANDS.—A common way is first to leave a strip of unplowed ground a rod wide at each end of the field; and after the rest of the field is plowed, to turn these over, by which the ends are made hard by the tread of the team. A much better way is to leave strips of untouched land at the sides, as well as at the ends, so that these may be all plowed together by the team going around the whole.

TO THAW FROZEN PUMPS.—Much labor is often spent to little purpose to remove the solid ice in pumps. It may be done very easily, and with astonishing rapidity, by setting the end of a lead or other tube within the pump on the ice, and pouring hot water down this tube by means of a funnel. The tube carries the hot water directly and constantly right against the ice.

EXPANSION OF HEAT.—A cold glass stopper put into a warm bottle, will become set so hard that no force can remove it, the glass contracting about it. The only way to remove such a stopper, or one made tight in any way, is to heat rather suddenly the neck of the bottle by a hot wet cloth, or by holding and turning it over a lamp; this will loosen the stopper. A warm nut was put on a cold screw, and when cold no man with a wrench could move it, till a red-hot iron, applied to the nut, loosened it. In another case, three men tried to unscrew a cast-iron pump tube, without success; but after heating the outer one, the application of the strength of a child unscrewed it.

SCIENTIFIC BRAINS.—A man dropped a costly pocket knife into a well of water twenty feet deep, and it was proposed to draw all the water out to get it. A scientific bystander suggested taking it out by a horse-shoe magnet suspended by a cord, the place of the knife being shown by throwing the sun's rays down into the well by a common looking-glass. It was successfully done in a few minutes.

OLD PUTTY, on windows requiring re-glazing, may be easily removed by moistening it with muriatic acid, which softens it at once.

WOUNDS IN ANIMALS are most quickly cured by washing several times a day with turpentine in which the yelk of eggs has been thoroughly mixed.

THE

ILLUSTRATED ANNUAL REGISTER

OF

RURAL AFFAIRS.

ORNAMENTAL PLANTING.

IT IS NEEDLESS at the present day to go into an argument to show that ornamental planting should engage the attention, and be adopted in practice by every resident in the country. The added market value which it imparts to every place is an inferior reason ; the attractions which it throws around the homes of young people are far more important, and they may prove the turning influence in their future lives.

In this country, where nearly every landowner has but moderate means, it is necessary to adopt economical methods for reaching the desired object. Costly plantations can be owned by very few. These pages will be devoted to suggestions for those who can afford but moderate outlay ; and while the work should be thoroughly done, it will be a leading object to make the money at the owner's command go as far as possible.

It is common to plant a few ornamental trees around the dwellings of farmers, with very little preparation of the ground beforehand, or care of it

afterwards. Grounds may be planted and kept in this manner as cheaply as any one could desire, but it is not our present object to speak of these imperfect attempts at ornamental planting, but of such grounds as are well and thoroughly prepared, well planted, and kept in good subsequent order. For small or village lots, no half-way management will satisfy those who are favored with good taste, even with limited means.

Laying Out the Grounds.

The first thing requiring attention is to form a plan of the whole grounds. If the dwelling is not erected, its position must be fixed. If the house is already built, the surroundings are to be determined. This may be done in part while draining and preparing the ground are going on, or before. The easiest way is to measure and map the whole; and then to lay out the roads and walks, the ornamental and vegetable garden, and the places for planting the trees. Here will be a large scope for the exercise of the ingenuity and taste—a subject so extensive that we have space only for general rules.

If the house has not yet been built, it will be a matter of economy to strip off all the surface soil where it is to stand, and cart it to the intended spot for the kitchen garden, and thus secure its fertility. To prevent treading and hardening the ground by builders and their teams, it is best to lay out the road and most frequented footpaths before the work is begun, and to finish them substantially with broken stone and gravel. Draining and grading may be done after the buildings are finished.

Those who have given but imperfect attention to landscape gardening, may be assisted at the outset in laying out their grounds, by the observance of

Some General Rules.

1. Winds.—Shelter from prevailing winds is an important object, and in arranging the plan of the grounds, masses or belts of evergreens or thick deciduous trees should be placed where they will break the force of the stronger or prevalent winds, when this does not interfere with more important ends.

2. Distant Views.—Another essential object is to preserve distant and pleasing views beyond the grounds, as seen from the dwelling or its vicinity. A lake, a picturesque valley, distant hills, a steeple or village, should never be excluded from the sight. Trees should not be planted at those points. Low shrubs may take their place if the view can be seen over their tops when fully grown.

Unpleasing objects, on the other hand, should be carefully shut out by dense planting—such as a rough building, a sawmill, or adjacent grounds kept in a shabby manner.

3. Expense will be avoided by adapting the design to the character of the ground. If this is already flat and even, it may be laid out at will; but if undulating or marked with hills or valleys, or cut with gorges, heavy

grading should not be attempted, but only the moderate rounding of asperities. Great advantages may be taken of the undulations for increasing the beauty and variety of the place, and a great deal comprised within a moderate extent of ground. The remote portions, especially if naturally or artificially planted with irregular trees, undergrowth and climbers, with natural rock-work, will require little attention afterwards, other than keeping in order the gravel walk which reaches them.

4. PLANS.—It is important on the score of economy to have the plan of the grounds perfectly digested beforehand. Otherwise, when the work is partly finished, alterations may be found necessary, and before all is completed it will be liable to become incongruous and unsatisfactory, and the whole will be more expensive than a regular and unchanged completion of the whole.

5. WALKS.—Another way to avoid expense is to have as few walks as may be admissible. If well made, they are costly; and they require a continued outlay to keep them in order. A single walk kept in perfect order is better than many, more or less neglected.

6. BOUNDARIES.—The boundaries of any place, especially if otherwise distinct and glaring, should be hidden by foliage. This will also increase the apparent limits of the grounds. Irregular belts, largely of evergreens, as in fig. 166, will usually accomplish this object.

Fig. 166.
Irregular Belt at Boundary.

7. Apparent breadth of ground is increased when a continuous green color is preserved between trees and lawn. When trees which flank the lawn are chiefly evergreens, the branches should sweep the grass.

8. The more irregular the ground, and the greater the variety in plan and outline, the greater will be its apparent dimensions. On the contrary, a flat surface, laid out in a formal or geometric style, will always appear smaller than it really is.

9. On small places, plant no trees which grow to large size, and which will overshade smaller trees and plants. Evergreens may be pinched and shortened back, and kept within bounds, but this essential care is apt to be neglected.

HARMONY AND VARIETY.—The skill of the landscape gardener is shown in combining these two qualities. A common mistake is the attempt to introduce too many objects; to crowd within a confined space the adornments of the most ample grounds. Simplicity, finish and perfection, are incomparably better than an incomplete jumble. Incongruity is often seen in the structures. A Grecian house has a gothic barn; a Grecian residence has a rustic summer-house in front; a conical pile of stones, meant

to imitate the massive rock-work of the tangled ravine, is placed in a formal garden; the wild and irregular forms of climbers are placed along with sculptured figures and vases.

Details of Operations at Beginning.

When new ground is occupied for building, the first thing to be done is to drain it thoroughly. This, of course, will not be necessary if, as rarely happens, it has a perfect natural drainage, so that water will not remain a day in post-holes at the wettest season of the year. The drains should be deeper and nearer together than for farm fields—not less than 3 feet deep, and not farther apart than 20 feet. The next operation is manuring all the ground except where buildings are to stand, breaking the manure up finely and mixing it thoroughly by means of the harrow and plow. When these two operations are performed, the whole may be made smooth and laid out, and seeding the lawn and planting trees may be commenced.

The question is often asked, what will be the expense of thus preparing and planting a lot of given size with a creditable finish? Much will depend on the previous condition of the ground, facilities for procuring stone and gravel, and various other circumstances and surroundings. In order to enable any owner to make the estimate for himself, we will give two examples of the cheapest and the more expensive preparation and planting. The cheapest is where the ground has already a natural drainage, has a smooth and even surface, and is in good condition as to fertility. A moderate amount of manure will be sufficient to start with; the only grading will be plowing and thorough harrowing, with slight work in leveling small asperities by hand. The following expenditure will be required for an acre:

Plowing four times and subsoiling once,	$15.00
Harrowing eight times,	5.00
Twenty 2-horse loads manure, and spreading,	40.00
Stone and gravel road, 100 feet,	50.00
Gravel walks, say 200 feet,	20.00
Fruit trees, small fruits, &c.,	20.00
Planting them,	10.00
Ornamental trees and shrubs,	50.00
Planting these,	20.00
Cost per acre,	$230.00

Every owner, on looking over this list, will make material alterations. Some items will appear too small and others too large. Nearness or distance to stone and gravel for the carriage road will greatly influence the cost of procuring them. The cost of fruit trees and ornamentals will vary much in different localities, and with the common or rarer sorts. Manure will often cost double the preceding estimate, drawn and spread. The total amount will even here be larger than many novices will expect; but to do the work well and creditably, at once, will require all that is given in the estimate.

The following figures are intended to apply to grounds where thorough drainage will be required, with strong manuring, grading the surface,

purchasing and carting rich loam for the surface soil on sterile ground, and buying high priced trees and plants. By grading is not meant reducing the whole to a perfect level, but smoothing and rounding the sharp knolls and hollows, by reducing the one 6 inches to a foot, and filling the other

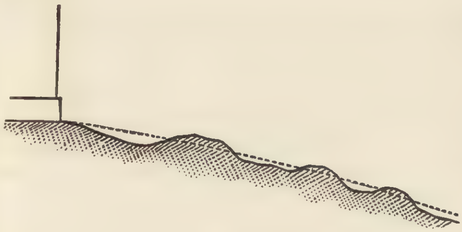


Fig. 167.—*Grading the Surface.*

to an equal depth (fig. 167). Much of this may be done with plow, scraper and harrow.

Draining one acre, 125 rods,	$60.00
Plowing, subsoiling and harrowing,	20.00
Forty loads manure, drawing and spreading,	160.00
Grading (extremely varying,)	30.00
Road and walks,	80.00
Trees and shrubs, fruit and ornamental,	100 00
Planting and smoothing,	50.00
Carting top soil and muck for dressing surface, say 100 cubic yards,	200.00
Total,	$700.00

Maintaining Grounds.

The cost of keeping grounds in order, per acre, will vary greatly with their finish. The farmer whose home grounds are planted with large shade trees, as oaks and maples, may, if he has no small shrubbery nor flower beds, have all the work done by a flock of sheep, which will keep the grass cropped short the season through. If he has a common earth road only, he will expend little in keeping it in order. If, however, he desires a more finished place, still cropped by sheep, a handsome, well-made carriage way kept in good order, will greatly add to the appearance, which will be still more improved by finished gravel walks. To keep these well they will need occasional weeding, cleaning and rolling, which should be done several times in the year, varying with the dryness of the season and other causes. To keep a carriage road in the best condition will cost for the year from half a dollar to a dollar a foot in length. A foot-walk will need about half as much labor per running foot.

If the place contains shrubbery and flower beds, the lawn must be cut by means of a lawn mower. The practice of allowing the grass to grow to be cut for hay can hardly be tolerated with any claim to taste. A compromise between a tall meadow and a smooth shaven lawn, by allowing the grass to grow half a foot or more in height, to be mowed occasionally by a hand scythe or a common mowing machine, may be better, but if cut by a lawn mowing machine, it will be most economical to go over the surface as often as every five days when the grass is growing rapidly, or

less frequently as the summer advances, and in early autumn. This will give a beautiful green carpet, like velvet, to tread on. The estimates per acre will therefore be nearly according to the following figures:

Twenty rods of carriage drive, average say,	$15.00
Twenty rods of foot-walks do.	7.50
Incidentals,	5.00
Annual cost per acre of sheep-grazed grounds,	$27.50

The farmer, therefore, who has four or five acres devoted to ornamental shade grounds about his house and other buildings, should be willing to devote a hundred dollars annually to keeping them in good order.

If he cuts the grass down to a velvet carpet with a lawn mower, he will add to this cost. If the grounds do not exceed an acre, he will find it most economical to use a hand lawn mower; if three or four acres, a horse must be employed. (The scythe should be discarded, as being imperfect, costly and laborious.) One man will easily go over an acre a day with a lawn mower, which should be used at least fifteen times during the season, costing about $22, to be added to the former estimate, and nearly doubling it. Additional walks, and the care of flower beds, will increase the expense a few more dollars, varying with their extent. The annual cost, therefore, for neat and finished ornamental grounds, interspersed with shrubs and flowers, may be put down at from $50 to $60 per acre.

When the grounds are reduced from an acre to a half or quarter acre lot, and only half of this is devoted to ornamentals, it will be seen that the expense and trouble of keeping them in order is quite small, or about $15 for a quarter acre, or $8 to $10 for the eighth of an acre on the quarter-acre lot.

Fig. 168. *Pole for Laying Curves.*

Details in Laying Out.

In laying out the curves of roads, walks and flower beds, we have found the pole represented in fig. 168 a ready and accurate instrument. On large grounds it may be 10 or 12 feet long, and on smaller from 4 to 6 feet; while a still shorter rod, about 2 feet long, may be conveniently employed in making the short curves in beds. It has an iron pin a few inches long fixed at the centre, *A*, for penetrating the surface of the ground; opposite to this pin is a small iron open socket for receiving the marking stake; and at *C* is a small graduated cross-bar.

Now, in using this rod, if it is laid on the ground, and stakes are inserted at *C*, *A* and *B*, and then the rod is moved forward half its length, without deviating to the right or left, it will make a continuous straight line; but if it is moved on the centre pin, so as to deviate to the right or left at each forward movement, it will make a continuously curved line. The greater the deviation at each move, the shorter will be the curve. The following is

the manner of using it: It is first placed on the ground in the direction for starting the road or walk, and the pin at the centre is slightly pushed into the soil. Small stakes are then inserted into the ground at *C*, *A* and *B*. The rod is then taken up and moved half its length forward, placing the centre pin close alongside the third stake. The rear end is then moved a certain distance, measured on its scale, to the right or left as may be required, which will cause the forward end to deviate an equal distance from the straight line. The continuous curve (fig. 169) is thus readily formed, which may be made sharp or long by measuring a greater or less distance on the scale. A short curve may be made to run gradually into a longer one, or vice versa, by a regular increase or decrease on the scale at each movement of the pole.

Fig. 169. *Curved Line for Walk.*

This simple instrument will not only enable the operator to lay out curves rapidly, but to do it with greater accuracy than by the common mode of using a rod without a scale, guessing the distance with the eye. A circle may be thus laid out if the deviation is uniform, and the work is carefully performed; or an oval or other figure made by varying the departure as may be required.

A ready mode of restoring with accuracy the outlines of circular beds is shown in figure 11, p. 28, vol. VII of RURAL AFFAIRS; and some modes are there given for constructing more complex figures. But with a short rod, say 2 feet long, all these curves may be made in the manner described. In using the long pole for laying out the long curves of roads, the work can be done by the assistance of a boy to set the forward stakes, but with a short rod the operator will work rapidly without help. The stakes may be of wood, about half an inch in diameter and six or eight inches long, but on extensive grounds they may be larger.

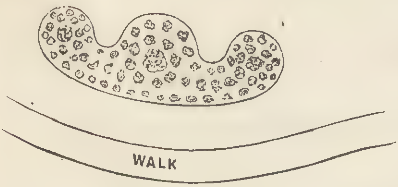


Fig. 170.—*Flower Bed.*

We have given the directions somewhat in detail, as owners who have not the services of a skillful landscape gardener at hand, are often puzzled to proceed, and awkward curves are the result.

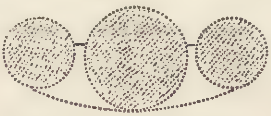


Fig. 171.—*Mode of Forming.*

Irregular beds for flowers may be made as in fig. 170, by drawing circles and joining them, fig. 171 showing the manner in which this is done, and fig. 170

the same finished and planted. Arabesque beds, represented in fig. 172, flanking the curved walk, require an accurate eye for designing them in the best manner; but a graceful and curved outline may be preserved by the use of a rope, the mode of working with which we here describe:

Fig. 172.—*Arabesque Beds.*

If small figures are to be laid out, the rope may be of moderate size, so as to make short curves; for large figures a larger and stiffer rope may be used. The operator places it upon the ground, and forms with it the outline of the proposed figure (fig. 173.) Then, be.ore beginning work, insert a few small pegs or stakes barely touching it. These will keep it at its place while the sharp spade is inserted all along its side in cutting out the bed.

Fig. 173.—*Laying Out with Rope.*

On very small pieces of ground, a rope will assist in laying it out, without the use of the rod already described; and on larger grounds, where the roads and walks have been already staked, a stiff rope placed along in contact with them will enable the workman to make a perfect curve with the spade.

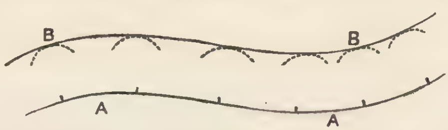


Fig. 174.—*Parallel Lines for Road.*

It is important to make the two sides of a curved drive parallel. An easy and rapid mode is first to lay out and stake one side, *A A*, fig. 174, and then place a rope parallel with this, *B B*, as nearly as can be readily done with the eye. Then take a pole of a length equal to the intended breadth of the road, and placing one end against each stake

successively, sweep the other end backwards and forwards against the rope, as shown by the dotted curves, which will place it precisely where it is wanted.

Laying Out Flower Beds.

For a large central flower bed, or one to be occupied with small shrubbery, a less formal and more ornamental outline may be given, as seen in

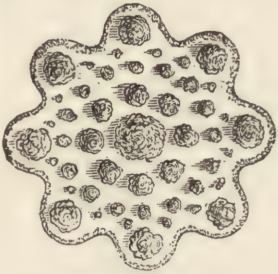


Fig. 175..—*Centre Flower Bed.*

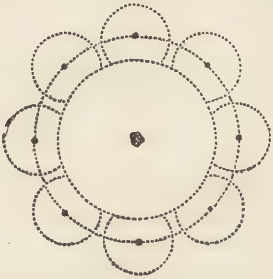


Fig. 176.—*Laying Out the Same.*

fig. 175. This bed is easily laid out by describing two concentric circles, as in fig. 176, and then making several smaller ones on the outer one.

Fig. 177.—*Symmetrical Beds.*

When a flower garden of some extent is desired on a lawn in the more finished part of the grounds, that the whole may be seen at a birdseye view, a handsome effect is produced by such a symmetrical arrangement as in fig. 177, the dark figures being the beds, and the white space the lawn. A simpler form is shown in fig. 178. An important advantage in such designs is the facility with which additional beds may be made, or the number reduced.

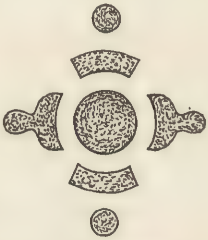


Fig. 178.—*Symmetrical Beds.*

Designs for Small Grounds.

The accompanying plan, fig. 179, represents a village lot or equivalent space in the country, about four rods wide and eight long, containing one-fifth of an acre. By placing the dwelling at one side, a greater breadth of grass is secured, which is planted with a few shrubs, and one irregular and three circular flower beds are in front of the entrance to the house.

A small kitchen garden, worked with the spade, is at the rear. A little labor mornings and evenings will keep such a snug place in perfect order.

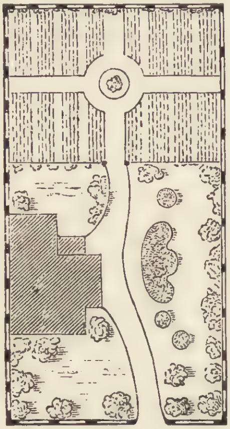


Fig. 179.—*Small Village Lot.*

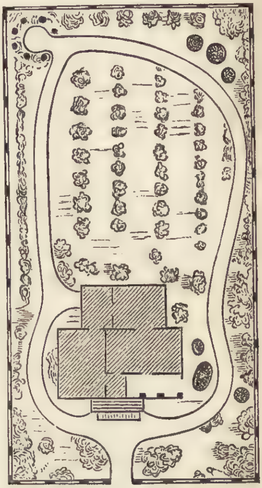


Fig. 180.—*Village Fruit Lot.*

Fig. 180 is a lot one-quarter larger, laid out so as to cover nearly the whole surface with fruit and at the same time secure some ornamental effect. The house is placed quite near the front entrance, to allow space at the rear for fruit trees and small fruits. Flower beds—one circular and three elliptical—are then placed at one side, three near the rear line, and a few small trees or shrubs in the front and rear. The rest of the grounds, except at the boundary and near the dwelling, is planted with fruit, which may be of some dwarf pears and apples, but mostly with currants, gooseberries, blackberries. raspberries, strawberries, &c., with a line of grapes on the left. A shaded seat at the left rear corner adds to the interest of the place. Properly planted and managed, such a lot as this would afford an opportunity for much skill in fruit raising, and it might be made an attractive home; while the vegetables between the rows of small fruits would contribute to the support and comfort of the family.

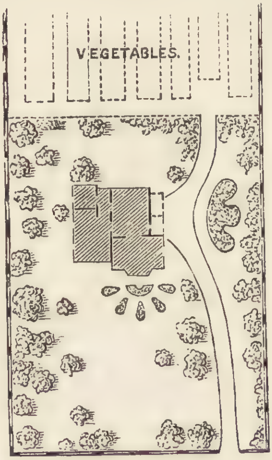


Fig. 181.—*Ornamental Village Lot.*

Fig. 181 is the plan for a quarter-acre lot, or larger, where the leading object is to have as much ornamental breadth as practicable. The walk, passing up near one side, gives a lawn at the centre. Flower beds for bedding plants of low growth and brilliant appearance are placed

in front of the bay-window, and a larger arabesque bed at the side may be occupied with larger plants or small shrubs. The single walk requires less labor to keep in order, and the whole may be kept in finished condition at moderate expense.

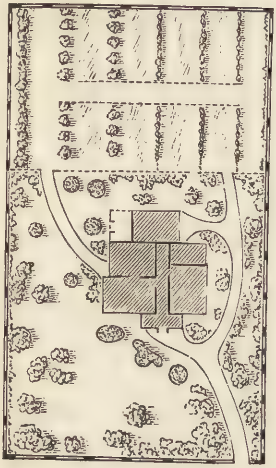


Fig. 182.—*Complete Village Lot.*

Fig. 182 is another plan of a lot of about the same size, possessing more conveniences from its walks, and having more space for vegetable garden, planted between the lines of small fruits and grapes.

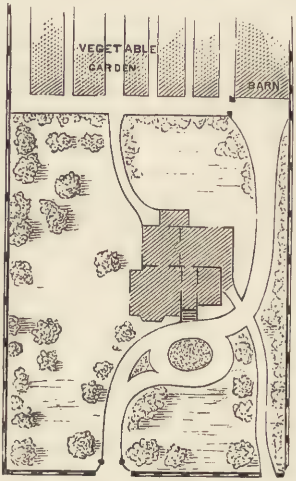


Fig. 183.—*Dwelling with Carriage Conveniences.*

Dwellings with Small Barns.

A lot somewhat larger in size than any of the preceding, is represented by fig. 183. The carriage road is distinguished in the plan by its greater width. A separate entrance is provided for the foot-walk. Carriages may be turned in front of the house, or in the area at the barn. The manure is easily conveyed to the adjacent garden.

Fig. 184 is a plan of grounds of from one to two acres, where less space is to be occupied with ornamentals, or more with fruit and vegetables. More than one-half, towards the rear, is planted with rows of dwarfs and the smaller fruits, namely, a line of grapes on the left, then three rows of currants, gooseberries and raspberries, a row of dwarf pears, another of dwarf apples, and peach trees at the rear of the barn. A variation of this arrangement would be to plant dwarf plums in place of one row of the small fruits. Between these rows of fruits ample space is allowed for garden vegetables, the arrangement of this garden admitting of free cultivation with a horse, and thus saving three-fourths the labor otherwise

required by hand. On the left of the dwelling, and in front of this garden, cherry trees of the smaller sorts are planted in quincunx form. These may consist of the large Morello, May Duke, Belle Magnifique, and Early Richmond. Cherry trees do not require high culture, and for this reason they may be placed at one corner of the lawn.

Of the front portion, very little is occupied with the road and walk, and the expense of constructing and maintaining these is therefore comparatively small. As the carriage road, however, serves the purpose of a foot-walk to the public road, it should be neatly made, and kept in good order. The broad gravel yard in front of the barn serves as a carriage turn, the centre being occupied with a pump, or fountain and tank.

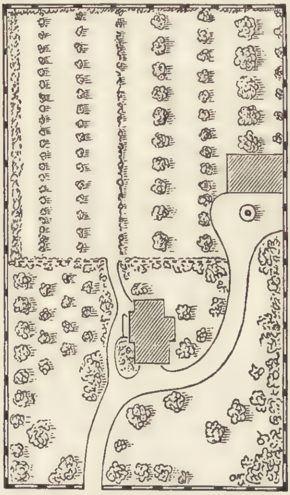


Fig. 184.—*Large Fruit Lot.*

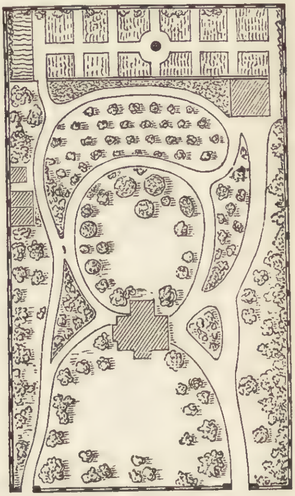


Fig. 185.—*Finished Ornamental Grounds.*

Fig. 185 is a plan intended for grounds varying from one to two acres, and it may be adopted for a large suburban or village residence, or for a farm, the owner of which can afford some expenditure to keep his home in finished order. If for the latter, the farm road will be placed to the right or left of the plan as here represented, and just without its boundaries, and the kitchen garden in the rear will be much larger, and be so arranged as to be cultivated by a horse.

The leading object of the plan is to place the dwelling in a central position, and to surround it with ornamental trees and shrubs bordering the lawn in front, and at the sides, with a flower garden and dwarf fruit trees at the rear. The carriage road at the right is distinguished in the plan from the foot-walks by its greater width. The entrance to the dwelling

being at the side, greater breadth and a clearer view of the lawn are given in front. A carriage turn is afforded on the right. Space between the carriage-house and the boundary admits a cart with manure to the kitchen garden. The flower garden at the rear of the dwelling consists mostly of circular beds cut in the smooth turf, this shape admitting of a more easy preservation of the outline, while at the same time the distribution of these beds may give any degree of freedom and variety. Immediately in the rear of the flower garden, the dwarf fruit trees are planted in quincunx form, and they may consist of dwarf apples on the Paradise stock, or of such dwarf pears as grow with greatest vigor on the quince, as the Duchesse d'Angouleme, Louise Bonne of Jersey, Doyenne Boussock and Beurre Superfin. The dwarf apples may be summer and autumn varieties of any selected sorts, and they will give a succession for family or table use at these times of the year. Between the dwarf trees and the kitchen garden is a trellis of grapes. The rear of the kitchen garden is planted with raspberries. The sides and rear boundaries are well flanked with irregular plantings of ornamental trees and shrubs.

Ornaments for the Lawn.

Fig. 186 represents a post for a rustic flower pot containing plants in bloom. It consists of a thick, round cedar post, with the bark on, (which will adhere if cut while dormant,) and after setting it is decorated with rustic work made from short, round sticks halved and nailed to the post. These should also have the bark adhering. When finished, all this added work should be heavily soaked with crude petroleum, applied with a large brush, which will improve the color, and make the whole many times more durable. The flower pot may be a wooden box with rustic mosaic, or it may be a common earthen pot, with a lattice frame made to fit it when set in.

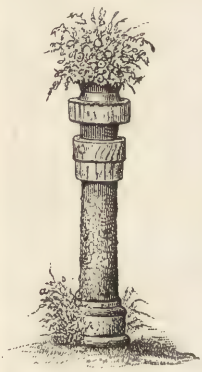


Fig. 186.—*Rustic Post for Flowers.*

Fig. 187 is a post for a dial. It may be either a rough or smooth post, of durable wood. sawed off level at the top for the reception of the dial. It may be ornamented with any slender climber, as a Cypress vine, Akebia, Periploca, or Aristolochia, but should not be covered so as to hide the post, as a trailing plant should be used only for ornamenting, but not concealing the object which supports it.

Fig. 187.—*Dial Post Ornamented with Climbers.*

PRACTICAL VENTILATION.

THE ATMOSPHERE, on which all breathing animals depend for their existence, surrounds the globe and extends about forty-five miles upwards. It may therefore be regarded as a shoreless ocean of air. From its great elasticity it is heaviest at the earth's surface, the superincumbent mass pressing the lower portion into narrower space. If as heavy above as at sea level, it would be only five miles high. Its lightness increases so much upwards that one-half its whole weight is within three miles of the earth.

The atmospheric air, at the earth's surface, is about 780 times lighter than water. From its bulk and lightness, it is tossed about and swept into currents through the action of heat and other influences, producing breezes, winds and tempests. A cubic foot weighs only $1\frac{1}{4}$ ounces at 32° Fah.; yet so great is its whole mass as to have a weight equal to a stratum of cast-iron 4 feet thick over the whole earth. The weight of the entire atmosphere is equal to that of 150,000 cubic miles of solid cast-iron.

Composition of Air.

Air is composed of about 21 per cent. of oxygen and 79 per cent. of nitrogen, in addition to which, ten thousand parts contain about four parts of carbonic gas, as shown in the relative areas of the circles, fig. 188. The proportion of this gas varies slightly, as for example, over lakes there is a little less and in cities slightly more, (never six parts in ten thousand) and it is also slightly diminished by rains; but still the variation from 4 parts in 10,000 is quite small. On the top of high mountains and at great heights reached by balloons, the same proportions are found to exist. This great uniformity is doubtless owing to the remarkable tendency of all gases to intermix thoroughly with each other, a striking illustration of which is shown by connecting two glass bottles, one above the other, by a long and slender tube, (fig. 189,) and filling the upper with hydrogen and the lower with oxygen, the former being sixteen

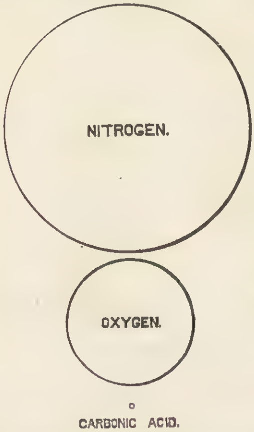


Fig. 188.—*Comparative Volumes of the three Gases.*


Fig. 189. *How Gases mix.*

times lighter than the latter. In a few hours the gases are found to be equally diffused through both vessels. This tendency to intermix causes the excess of the carbonic acid gas produced in close rooms by breathing and from lamps, to become equally diffused in a short time through the upper and lower portions of apartments, and analysis of air at the ceiling and at the floor shows scarcely any difference in the composition.

POISONOUS AIR.—Pure carbonic acid is a deadly poison when breathed, and air largely mixed with it is fatal to animals. But the small portion (one part in twenty-five hundred of common air) exerts no deleterious influence, nor is any bad effect observed when the proportion is doubled. It is therefore regarded as safe to breathe air containing not over eight parts in ten thousand. But a much larger portion often exists in close rooms filled with people. For it has been ascertained in many ways, that the air thrown out of the lungs in breathing contains about one hundred times as much carbonic acid as the air of the atmosphere. Instead of only four parts of this gas in ten thousand, as in pure air, the air from the lungs contains about four hundred parts in ten thousand. If therefore a person continues to breathe in a confined room, he rapidly increases the amount of carbonic acid, and thus renders the air more or less poisonous. It has been found that in lecture rooms, meeting houses and schools, after being crowded for an hour or two, and where adequate ventilation has not been provided, the carbonic acid is often equal to thirty parts in ten thousand, and sometimes as great as fifty or sixty parts. This is a principal cause of the frequent headaches in large schools, and is always highly detrimental to health.

EFFECTS OF BAD VENTILATION.

L. H. Leeds quotes from a report to Congress on this subject, from which it appears that the air in many sleeping rooms in the morning has been found to contain from forty-eight to fifty-two parts of carbonic acid in ten thousand ; school-rooms, thirty to fifty-six ; hospitals, thirty to forty-three ; beer saloons, forty-nine ; lecture rooms, from thirty-two to sixty-seven ; and in a compactly filled school room in one case, seventy-two parts. When the exposure to such a mass of poison is only occasional or accidental, continued breathing of fresh, pure air afterwards may effect a restoration from its effects ; but where it is continued day after day, as in school-rooms, and night after night, as in domitories, the results are always more or less serious.

In Philadelphia, one of the healthiest large cities in the Union, statistics have shown that 40 per cent. of all the deaths may be traced to the effects of foul air, which would be 6,800 deaths in the city from this cause in one year. Physicians estimate twenty-five to thirty days sickness to each occurrence of death, which would give about two hundred thousand days of sickness annually in Philadelphia resulting from a want of proper ventilation—see Leed's Lectures. The pecuniary loss may be estimated ; the

pain and anxiety cannot. Many millions in money are yearly wasted in the United States from a want of information, to say nothing of the value of the many thousand human lives.

The trouble is not confined to cities; throughout the whole country pale faces and feeble health, deaths among children, and consumption among adults, are a fruitful result of close rooms and bad air. Daniel Leach, Superintendent of Schools at Providence, R. I., says: "I have given much attention to the subject for more than twenty years, and I firmly believe, from careful observation, that very many cases of consumption, heart disease, and kindred maladies, have had their origin in the foul air that is breathed in school rooms and other crowded places." Dr. Kedzie examined the air of thirty school-houses in different parts of Michigan, and found in many of them an amount of carbonic acid between thirty and forty parts in ten thousand, and in these schools headaches, catarrhs, cold feet, lassitude and other results were either very common or almost universal. In some instances where improved modes were adopted to supply air from without, these troubles were at once lessened or removed.

How Air is Vitiated.

The amount of air breathed by any person in a given time, varies with circumstances. For instance, when walking slowly he breathes twice as much air as when lying down or sitting; when walking at the rate of about three miles an hour, he breathes three times as much, and when swimming he breathes four times as much. The average, however, under all circumstances, is about twenty-four cubic inches at each breath; and the average number of respirations per minute about twenty. He would breathe four hundred and eighty cubic inches in a minute, or a cubic foot in three and a half minutes. This would be four hundred cubic feet in twenty-four hours, or enough to fill a room ten feet square to a depth of four feet. Every active adult person breathes about thirty pounds of air in each twenty-four hours.

But for healthy respiration he will need at least fifty times as much air, or twenty thousand cubic feet, or enough to fill eighteen rooms ten feet square and ten feet deep. The reason of this is that all the air which he throws out by breathing has about one hundred times as much carbonic acid as the pure air of the atmosphere which he takes in. Thus pure air, as already stated, has only four parts of carbonic acid in ten thousand; while the expired air from the lungs has about four hundred parts of carbonic acid in ten thousand, and consequently it needs to be very largely diluted with pure air. If we had to breathe the same air over again, without any admixture of unbreathed air, we could live but a short time in an atmosphere so fatally charged with poison.

There are other deleterious matters in breathed air, but they may be generally estimated as nearly equal in measure to the carbonic acid, which

is commonly accepted as a fair index to the proportion of other accompanying impurities.

The amount of carbon thrown out daily in breathing by an adult person is rarely appreciated. It amounts to more than a quarter of a pound, and if separated from the oxygen with which it is combined, would constitute this amount in lampblack. Thus every healthy and active man yearly discharges from his lungs in expired breath about 100 pounds of lampblack in a state of combination.

Aggregate Amount in the Atmosphere.

It will be an interesting calculation to ascertain how much carbonic acid gas is thrown into the air every year by all the persons, animals and fires of the whole globe, allowing for the animals and fires seven times the amount made by the breathing of the thousand millions of human beings. The latter breathe out 3,000,000,000 tons of carbonic acid gas in a year, and animals and fires produce 21,000,000,000 tons more—equal to 24,000,000,000 tons in all. Looking at this immense mass, it would seem at first glance that the whole atmosphere must become speedily filled with poison. But a careful calculation will show that there are no less than 2,000,000,000,000 tons of carbonic acid in the whole atmosphere, although constituting but a twenty-five hundredth part, a sum eighty times as great as all the yearly consumption. It would therefore require eighty years to double the present amount, or to increase it to eight parts in ten thousand, which would not affect the health in breathing. But this increase, only one-eightieth part, is yearly withdrawn, and exact equilibrium kept up, by the growth of plants and trees, and by various other processes of nature.

A more accurate estimate of the products of fires and animals may vary this estimate, or increase or diminish it possibly to some extent.

How Ventilation is Effected.

Ventilation consists essentially in bringing in a constant current of fresh air, to mix with or replace the foul air which is drawn or driven out by the operation. Millions of human beings in the open air cannot vitiate it to the least appreciable extent, but as soon as a few are confined in an apartment, the air they breathe is quickly rendered unwholesome or poisonous. It has already been shown in this article that, although each individual breathes at most only about 400 cubic feet of air in twenty-four hours, yet, on account of the large quantity of carbonic acid expired, each adult person should have not less than 20,000 cubic feet of air to breathe in a day, in order that the amount of carbonic acid may not exceed eight parts in ten thousand. This would be equal to the contents of a room 25 feet wide, 40 feet long, and 20 feet high; or of four rooms each 20 by 25 feet, and 10 feet high. This supply can be obtained only by a constant current of fresh air from without; and to furnish this supply and to avoid the bad effects of chilling currents, is the object of ventilation.

It is commonly effected by producing currents through the agency of heat. The principle on which this kind of ventilation depends may be understood by a simple experiment. Procure a glass jar open at bottom and top, and place it on a smooth table. Insert within it a small lighted candle or taper, fig. 190. The bottom fitting closely on the table, no air enters below, and in a short time the oxygen of the air within the jar is so far consumed, and so heavily replaced with carbonic acid produced by the combustion, that the candle in a short time goes out. Now raise one side of the jar below, by inserting a small stick or pebble, fig. 191, and re-light it. The candle now produces a current of fresh air from below, and continues to burn without any diminution. The air within the jar is expanded by heating, and being thus made lighter, rises through the opening at the top. Fresh air rushes in below to take its place, and a perpetual current is thus produced.

Fig. 190.—*Glass Jar tight below.*

Fig. 191.—*Ventilated Glass Jar.*

On this principle, all common contrivances for ventilating rooms are constructed.

If a large vertical tube has the air heated within it, that air becomes lighter, and rising produces an upward current, as shown by the arrows in fig. 192. If, on the contrary, it is surrounded with ice, the air within becomes heavier, and falls, producing a current downwards, fig. 193.

The longer the tube and the column of air within it, the stronger will be the current of air. If the contained air is warmed, it will rush upwards with more force in a long tube than in a short one, (fig. 194,) but if the contained air is made colder, a long tube will cause a stronger downward current than a short one—in the same

Fig. 192.—*Upward Current.*

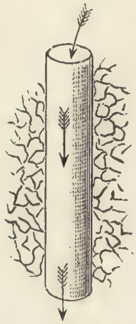


Fig. 193.—*Downward Current of Air in Ice.*

Fig. 194.—*Rapid Upward Current.*

way that a high head of water causes a stronger current than a moderate head, its increased weight rushing downward with more force.

The greater the difference in the temperature of the air within and without the tube, the more rapid will be the current.

Nearly the same rules that govern downward currents of water may be applied to upward currents of heated air, with this difference, that the air being about eight hundred times lighter, is more easily interrupted, checked or reversed by winds. For example—a horizontal stream of water may be made to run rapidly by a high head above, driving it, or a long column below drawing it. In the same way (but more feebly, and often irregularly,) the air may be driven through a horizontal tube connected with a heated vertical column below, or drawn or sucked through it if connected with a heated vertical pipe above. In fig. 195, *A* is a tube or stovepipe, which has been made hot, and the air within it, rushing upwards, draws the flame at *B* downwards and along the horizontal pipe.

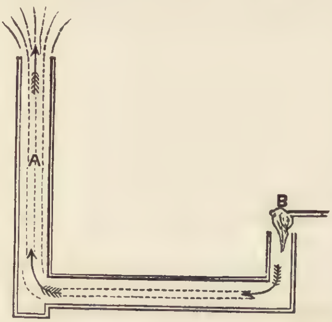


Fig. 195.

We have sometimes observed, on a sharp winter morning, that a certain room in the dwelling appeared to be so tight and free from crevices that it appeared impossible while there was no fire in the room that air could have entered it from without. But as soon as the fireboard was removed, and a wood fire started in the open chimney, it seemed as if a hundred voices broke forth at the windows and doors, in the whistling currents streaming into the room through minute crevices to supply the place of the air rapidly rushing up the chimney. Here was a striking proof of the importance of establishing an ascending current by means of heat, to effect the proper ventilation of the room. For, until the fire was built, there was no change of air. The church deacon was correct in his observation, but wrong in his theory, when he complained that the new stove in the previously unheated church, was so small that it only warmed the centre by driving the cold away into the remote parts, making these parts colder than before! When no fire existed, the remote occupants did not feel the cold streams which afterwards came in from all sides as soon as an upward current was established by the fire in the stove.

Modes of Ventilation.

In the early history of the country, or in the newly settled regions, the rude dwellings required little attention to ventilation, as wind currents poured in through the many crevices in the log dwellings, and the air of

the apartments was rapidly swept up at the open fire-place, through the large-throated chimney. Nearly all the heat received by the inmates was by means of radiation from the roaring wood fire—requiring frequent turning about to heat one side while the other was chilled. It was then, as some writer has remarked, "when men lived in houses of reeds, they had constitutions of oak; but when they live in houses of oak, they have constitutions of reed." They were however liable to the many diseases induced by the malaria of new countries, and they were more subject to maladies connected with colds when so continually exposed to sharp currents of air.

Whatever mode may be adopted for ventilation, special care should be taken to warm the fresh air before it is discharged directly on the occupants of the rooms, and to avoid the formidable diseases resulting from cold blasts blowing in from open windows on seated inmates with uncovered heads; for, as Dr. Angus Smith has remarked, "though foul air is a slow poison, we must not forget that a blast of cold air may slay like a sword."

The modes of heating now commonly employed, beginning with those which afford in themselves the least ventilation, are four in number:

1. As STEAM RADIATORS OR HOT WATER PIPES* merely heat the air of a room, without changing it at all, additional provision is absolutely necessary for supplying fresh air.

2. AIR-TIGHT AND OTHER STOVES change little more than the air required in the consumption of the fuel, and additional ventilation is necessary.

3. HOT-AIR FURNACES, if properly managed, with large air-pipes and with suitable ducts for the discharge of the air of the room, afford good ventilation, with no cold drafts; and if enough water is evaporated to prevent unpleasant dryness, they afford a good means of heating and ventilation. It is, of course, of the first importance that the tubes or trunks for supplying fresh air should receive it where it is pure and free from dust and bad odors.

4. OPEN-AIR FIREPLACES afford constant and rapid ventilation, with the loss of about seven-eighths of the heat of the fuel, discharged up the chimney.

Where stoves or radiators are employed, a small grate or open fireplace, consuming little fuel, and used in connection with them, will usually afford all the ventilation necessary, and give a pleasant apartment. The addition of a small open fire to a hot-air furnace will not only increase the agreeable character of the room, but assist in maintaining a pure air.

The accompanying representations of the sections of rooms thus heated,

*This mode of heating is adapted to large buildings only, and is too expensive for smaller establishments. The danger of leaks and explosions is a serious drawback, and its chief advantage is in carrying heat to a distance horizontally.

and of the air currents in ingress and egress, will serve to explain the course of these currents and the manner in which they maintain the purity of the air.

Fig. 196 represents the section of a room heated by means of a hot-air furnace; this furnace, being near the centre of the house, discharges hot air at one side of one of the rooms. The dotted lines and arrows show the course of the heated air in the room. For the purpose of giving the air a ready and uniform escape, a large air shaft or brick chimney is built, and within it is the large stovepipe from the kitchen or furnace below, or from some other regular fire, which heats the air about it in the air shaft, and causes a strong upward current. The air of the room, near the floor, is thus constantly carried off up the chimney at *B*, to be replaced by the fresh heated air from the register *A*.

Fig. 196.—*Ventilation for Warm-Air Furnace.*

Two important objects are attained by placing the discharge pipe near the floor. The air being colder near the floor, and warmer toward the ceiling, we get rid of the coldest portion and retain the warmest, and thus economize heat. (It has been already shown that no material difference exists in the purity of the air, or in the proportion of nitrogen and carbonic acid near the floor or near the ceiling, as they soon become intimately intermixed.)

The other point gained is in promoting a thorough circulation of the air of the room, so that all parts become heated nearly alike. If the escape is made near the ceiling, as is sometimes done, the hot air rushes to the top and passes out without heating the rest of the air of the room, which remains cold, as well as impure, at the bottom, as shown by fig. 197—which, as Dr. Kedzie remarks, "is like the housewife throwing away the cream that rises to the top, while carefully preserving the skim-milk that remains at the bottom." The occupants of the room, therefore, while they may have the head warm, will inevitably suffer from cold feet; and small children placed on the floor may become chilled, and suffer, and be attacked with

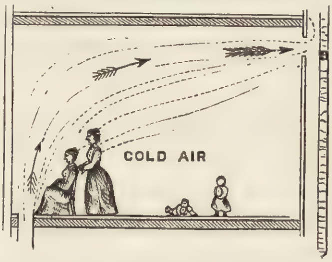


Fig. 197.—*Unequal Ventilation.*

colds and croup, and be charged with being "fretful," by their supposed care-takers, who enjoy the comfortable air above—fig. 197.*

Fig. 198 represents a room heated by a hot-air furnace, and ventilated and partly warmed by means of a small grate or open fireplace opposite. In this case a simple chimney will answer to draw off the bad air, and need not contain an air-pipe within it, (as in fig. 196,) for the heat of the open fire will produce a sufficient draught to draw off continually the air from the room.

Fig. 198.—*Furnace and Open Fireplace Combined.*

It must be borne in mind that the chimney which is thus employed for removing the foul air, should possess sufficient height to cause a constant current. If quite short, it will be likely to possess a feeble draft.

The proper size of all air-shafts, and ducts for the withdrawal of impure air from occupied rooms, will be explained in another part of this article.

Ventilating Stove-Heated Rooms.

The cast-iron stove, the most common heater in the dwellings of the American people, and which Leeds justly asserts is worth more than all the gold mines of California, is attended with less expense than any other heater in purchase and in the supply of fuel, and has been needlessly denounced. The want of ventilation with which its use has been generally attended, is charged as a fault of the stove itself. Charles Dickens went so far as to stigmatize it as "that eternal, accursed, suffocating, red-hot demon of a stove, so commonly found in America," and other writers have followed nearly in the same strain. If the stove is large enough to warm the room without being heated to redness, there will be nothing of the "burnt-air" odor which results from burning the minute particles of organic matter always floating in the air,† which is so un-unpleasant to all.

The main defect in the use of stoves comes from the fact that the air currents up the pipe, produced by the very moderate amount of fuel used, are quite insufficient to change the air of the room enough for the health of the occupants. Hence the headache and lassitude so common

* In rooms as commonly warmed by stoves and furnaces, without any provision for equalizing the temperature at the ceiling and floor, there is usually not less than 20° difference, as any thermometer will readily show.

† An electric beam through the air has shown the presence of impalpable dust, and that inhabited apartments are charged with this organic matter.

in closely heated rooms. All we have to do is to add some adequate means for effecting good ventilation.

Dr. Kedzie proposes two modes, one cheap, simple and imperfect; the other attended with a moderate expense, and much more effective. The first is simply to admit cold, fresh air at the top of the window, by inserting two panes in the upper part of the sash—a space *below* the outer pane and a space *above* the inner pane, as shown in fig. 199, so that when the current enters, it is deflected upwards into the room, and tends to become mixed with the warmer air in its descent. The draft of the stove not being sufficient to change the air of the room, we would place a register near the floor, to allow the foul air to escape by being drawn upward in the chimney with the warm air from the stove-pipe, which produces an upward current. An easier and more efficient arrangement to throw the entering air upward into the room, would be to screw a sheet of zinc or sheet-iron on the upper edge of the window sash, as shown in section by fig. 200, and then drop, more or less as required, the upper sash, so as to leave a proper opening. The breadth of the sheet of metal, and its upward inclination, would direct the current farther into the room. For this contrivance, the upper casing should be so made that it will allow closing the window when desired. It has the additional advantage of increasing or lessening the amount of admitted air, according to requirement, by raising or lowering the sash to any degree.

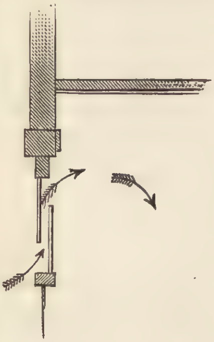


Fig. 199.—*Ventilating through a Window.*

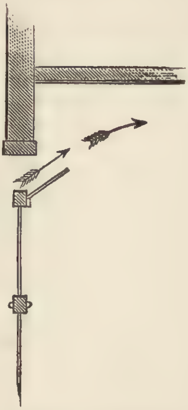


Fig. 200.—*Window Ventilation—another mode.*

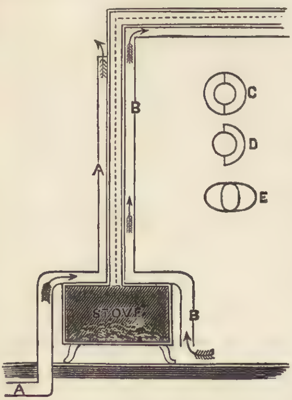


Fig. 201.—*Ventilating a Stove Room.*

The other mode proposed by Dr. Kedzie, is effected by the following contrivance, fig. 201, which depends on the same principle as that adopted in

the use of hot-air furnaces, and described under fig. 196, the heat of the stove being employed both for removing the foul air and for warming the fresh air: A stovepipe, say six inches in diameter, is placed within another pipe a foot in diameter, which may be called *the shaft*—shown in cross section at *C*, fig. 201. The stovepipe is thus enclosed within the shaft, and a space of three inches surrounds it. This space is divided into two parts by a partition of sheet-iron on each side, extending all the way up, and thus making two shafts, one of which is the fresh-air shaft, for admitting and warming the air from without; and the other is the foul-air shaft, for carrying it off. These shafts are closed below by resting on the top plate of the stove, only the stovepipe for the smoke entering the stove at the top plate. The fresh-air shaft, *A*, is fed by a six-inch pipe coming in from without, under the floor, as shown on the left. It extends nearly to the elbow above, after which the cross-section is as in *D*. Another six-inch pipe, *B*, opening near the floor, enters the foul-air shaft just above the stove, and this air is conducted to the chimney.

Now this contrivance will work as follows: The vertical stovepipe will heat the air in both shafts, and make upward currents. The fresh air, made warm, will pour out into the room at the top, and the foul air, near the floor, will be sucked up by the foul-air shaft, and will pass into the chimney. These two currents operating together, will cause a downward flow of air from the top of the fresh-air shaft to the bottom of the foul-air shaft, and tend to equalize the temperature of the upper and lower parts of the room, at the same time that pure air will be constantly supplied.

The construction and the erection of the stovepipe as here designed, will be somewhat difficult and rather complex. We would propose a simpler form, and one which will be more easily set up, by placing one oval pipe within another and a larger one, as shown by the section *E*, fig. 201; or more distinctly, and on a larger scale, by fig. 202. They are to be merely riveted together at the place where they touch, and will thus form three divisions—the central or smoke-pipe, and the two shafts on either side, which will be warmed by the central one containing the ascending smoke. This double-oval pipe is first to be set in its place on the stove, and then the two short pipes for supplying fresh air and carrying off the foul air inserted into it in any convenient position.

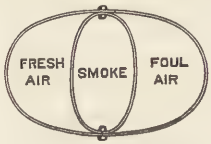


Fig. 202.—*Cross-Section of Compound Stovepipe.*

Prof. Leeds proposes to avoid the cold currents which stream in at the bottoms of doors and from other crevices, by bringing in the fresh air through a pipe which shall discharge it directly over the stove, on which it will fall and become warmed as it descends down its sides. This would answer well when the wind comes from the same side as the fresh air pipe; but when it shifts to the other direction it would blow the air of the room out through this fresh-air pipe, and the warm air over the stove would be

wasted, while cold currents would enter by crevices on the windward side. The same difficulty, but in a much less degree, exists in Dr. Kedzie's contrivance. It would be obviated in both cases by a pipe on each side, closing the one on the lee side and opening the other.

An efficient contrivance for ventilating stove rooms is described in the COUNTRY GENTLEMAN by its correspondent "W." of Tyrone, Pa. An air-pipe, fig. 203, brings in a supply of fresh air from beneath the floor, and being heated by near proximity to the stove, causes an upward cur-

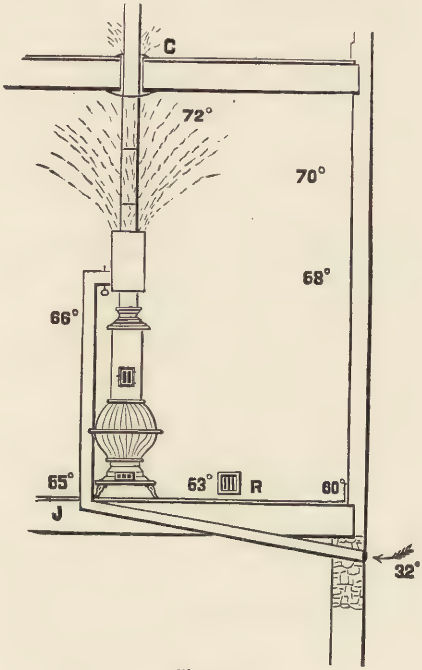


Fig. 203.

rent, drawing in the air from without. It is delivered in the direction of the ascending current of heated air above the stove, and then tossed along the ceiling in all directions. The register *R*, inserted in the lower part of the chimney which receives the stovepipe above, conveys off the air from the lower part of the room, causing downward currents, and nearly equalizing the temperature above and below. Another portion of the air near the floor is carried up in the air current which feeds the fire in the stove, which is not enough in itself for perfect ventilation. As a proof of the

efficiency of this contrivance, it is stated that before its adoption the temperature of the air near the floor was about 50 deg., and at the ceiling it was 80 deg., while now the greatest difference is not more than 8 deg.

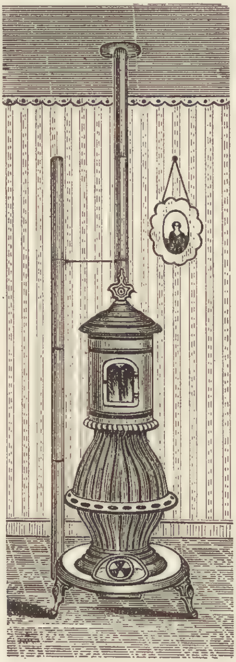


Fig. 204.

Fig. 204 is a modification of this contrivance, the air in the warmed pipe which brings the fresh supply from without, being discharged near the ceiling, and operating not unlike the air currents admitted at the top of the window already described, but unattended with any cold current.

Ventilation of School-Rooms.

School rooms and public halls, occupied by large numbers of people, need a better ventilation than private dwellings. Such rooms should have several registers for the escape of foul air, distributed in various parts. The flues from these registers may pass to the large vertical air shaft, by being placed under the floor, between the joists, and between the ceiling of the room below and the floor above. If the room is not large, a few registers around it near the floor will be sufficient.

Fig. 205 is a plan of such a room, where *A* is the chimney, built large enough to serve as an air shaft, and containing within it the round pipe from the furnace in the basement, or from the stove in the room, as the case may be. *B* is the place for the hot-air register from the furnace or for the stove, and *C C C C* are registers at the floor for the escape of foul air. The double dotted lines show where the tubes are which carry the foul air to the shaft *A*. These tubes are immediately beneath the floor, and between the joists, which run parallel with the tubes until they reach the turn which carries them to the shaft. For this purpose the joists are not let into the timber which supports their ends at the dotted line *D D*, but simply rest upon it, allowing the tubes to pass over it and between the joists.

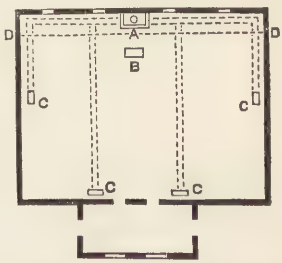


Fig. 205.—*Plan of Small School Room, showing Ventilator Ducts.*

By this arrangement the heated air from the furnace or stove at *B* rises and is carried down again in the currents which set towards the four air registers, as shown in fig. 206, representing a vertical section of the room, *A* being the shaft, with smoke-pipe within it, *B* the hot-air pipe, and *C C* the registers for foul-air pipes, which pass under the floor to the shaft *A*.

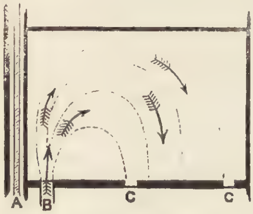


Fig. 206.—*Vertical Section of School Room.*

In the plan, fig. 205, it would be more convenient in some respects to place the hot-air register or stove near the entrance doors on the opposite side, but a serious disadvantage would be that at every opening of the doors the warm air would be swept out-doors and wasted, while in the arrangement as represented, the warm air must cross the half or whole breadth of the room before it can escape, and will thus impart its warmth to the occupants—shown in vertical section, fig. 206.

Where the stove only is used and the room is of moderate size, there is less objection to a door entering on the same side as the stove, and in this case the series of foul air pipes may be simpler, as shown in the plan, fig. 207, the three at *C C C* being sufficient to equalize the air of the room.

Fig. 207.

It is hardly necessary here to remark, what is familiar to furnace builders, that fresh-air tubes which lead to the furnace should be placed on opposite sides of the hot-air chamber, so that a constant supply may be had when the wind changes to opposite sides of the house. Otherwise a strong wind in a contrary direction will blow the warm air from the chamber through the tube out-doors. A valve or slide in each tube, readily accessible and easily closed will thus entirely control the current in whatever direction the wind blows.

In larger schools and more ample assembly halls, a larger number of foul-air pipes will be necessary, and they may be placed beneath desks or permanent tables.

An objection to placing registers for the ducts in the floor is the danger of their becoming filled by careless attendants, who may discharge the sweepings down them. Where this difficulty is feared, they may be placed in the side walls near the floor, the ducts being made to meet this arrangement.

When carpets are laid on the floors, it will be most convenient to place the ducts in the side walls.

Large School-Rooms.

Dr. Kedzie gives the following description in the First Report of the Michigan Board of Health, of a country school-house capable of seating one hundred and twenty-six scholars, and warmed by a stove. We have

diminished his plan with little alteration in fig. 208. It possesses all the essentials for good ventilation.

"The air to supply the lower room enters by the air-pipes marked *A A*, passing beneath the floor and opening under the stove, *B*, around which is a galvanized iron jacket entirely surrounding the stove (recessed for the stove door) and rising up as high as the top of the stove, [according to Ruttan's method.] The space between this jacket and stove is one foot on all sides. The cold air as it enters is thus warmed by the stove before reaching the inhabited part of the room. The scholars sitting near the stove are screened from the excessive heat of the stove, by this jacket.

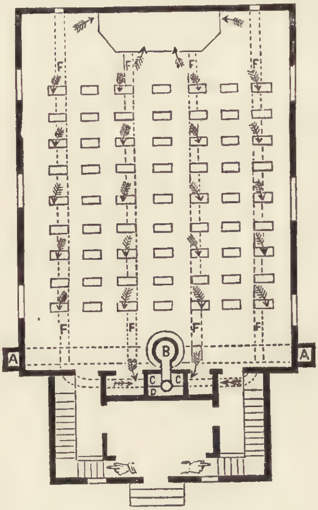


Fig. 208.—*Plan of School-house, with Ducts Under the Floor.*

"The foul air is drawn off by the foul-air ducts, *F F F F*, these ducts being formed by the spaces between the joists which run lengthwise with the body of the house, while the joists in the vestibule run at right angles to these.* The direction of the foul air is indicated by the arrows at the floor level. The foul-air flues all terminate in the front half of the ventilating shaft, *D*.

"The pointers in the vestibule show the direction of ascent up the stairs.

"It is essential that the ventilating shaft should be carried up some distance above the ridge of the roof, with a cowl on the top.

"The position of the stove in the upper room is the same, and is supplied with air in the same manner as the stove in the lower room.

"The foul air of the upper room is drawn off by foul-air ducts exactly corresponding with those in the lower room, except that they all enter the compartment *C* in the ventilating shaft. For successful ventilation I consider it essential that the foul air of each room shall enter a separate compartment in the ventilating shaft, and not one common shaft. These separate compartments are secured by having vertical iron plates passing from the smoke-pipe to the interior surface of the shaft where they are

* As we have already stated, the joists should rest on the cross timber, and not be let into it, so as to allow these ducts to pass. The arrows under the alternate desks show where registers are placed for the escape of foul air into the ducts—thus giving equal ventilation to all parts of the room.

imbedded in the brick work. In this way two or more ventilating shafts may be made, with the smoke-pipe as their centre, and all warmed by the waste heat of the smoke-pipe, these ventilating shafts having no communication with each other throughout their entire length.

" By placing a small stove in the bottom of the ventilating shaft (in the basement), the smoke-pipe in the centre of the ventilating shaft can be heated, and the ventilating system kept in active operation without warming the school-rooms even in the hottest weather. [Or, if the wind is strong, Espy's caps at the top will produce sufficient current without fire.]

"The fresh-air flue, *A A*, is represented double, so that fresh air can be secured, whatever is the direction of the wind. Each extremity of the fresh-air flue should be provided with a valve to open or close the flue, and thus regulate the influx of cold air, even when very high winds prevail. The handles of these valves will be in the school-room, so that the teacher can open or close the valves, and thus control the flow of air without leaving the room. The teacher alone should have control of these valves. The air to feed the fire in the stove should be drawn from the school-room, and thus assist in ventilating the room."

It will be observed in this plan that the stove is so placed that currents from the entrance doors will not be likely to carry much of the heat from it out through these doors.

Dr. Kedzie further observes, in urging the importance of creating a circulation in the upper and lower strata of air: " Infants creeping on the floor often suffer from the cold, while the mother is living in a warmer climate of the upper air. She wonders 'what makes baby so fretful,' and on lifting the little sufferer, she is astonished to find how purple and chilled his limbs are. Children at school often suffer in the same way. The thermometer hung up six feet from the floor, marks 65°, and the teacher pronounces the room warm enough, and attributes the complaints of the little ones to that manifestation of total depravity, 'children are always complaining.' With the head hot and the feet aching with cold, how can they be sweet and placid? In examining the school-rooms in this State I made frequent observations on the temperature at the floor-level and at the desk-level, and often found the difference from 8° to 15°—in one instance 19°, and in another 21°."

In all contrivances of the kind there is no fear that a draft will not be produced at each duct register; for if the air is heated in the shaft, so as to rise with considerable force, it will not fail to draw the air down from the room at every opening connected with it.

WARM-AIR FURNACES.

Leeds, in his Lectures on Ventilation, speaks of the use of "the miserable hot-air furnace," as a " refined system of murdering human beings," which has " spread like a devouring pestilence over the whole land," and he says that "all warmed air is unwholesome and debilitating," and in proof

cites "the fearful mortality whenever the air in summer reaches nearly the temperature of the body," although warmed by the sun itself.

Now the observation and experience of forty years satisfies us that warming by furnaces has special advantages, and it need have no drawbacks. 1. Instead of warming a room, as above stated, to "nearly the temperature of the body," we would never come within twenty-five degrees of this temperature. 2. The heat of summer becomes unhealthy because it rapidly promotes putrefaction. 3. A temperature of 68° or 70° in summer air is neither debilitating nor unhealthy in itself, but pleasant and refreshing.

The furnace, properly managed, has important advantages over other modes of heating: 1. It furnishes a constant supply of fresh air from the atmosphere without, and a room thus treated may have the air changed without trouble several times in an hour. 2. The dryness, so often objected to, may be prevented by a large evaporating basin in the air chamber, which should be kept perfectly clean, and there should be at least eight or or ten gallons evaporated every twenty-four hours in winter, for every room containing 2,000 cubic feet of air occupied during the day. 3. The odor of "burnt air" may be entirely prevented by using a furnace large enough to obviate heating to a temperature approaching redness, and by providing air-flues so large that the heat of the warm air entering the room may never be above blood heat. This would silence the objection so often repeated, that red-hot iron permits the passage of carbonic oxide through thick plates, by which this deadly poison enters the room.*

The evils of hot-air furnaces come from insufficient fresh-air tubes; from too small capacity, requiring high heating; from small warm-air pipes, and from the absence of evaporating dishes.

The amount of dryness in the air of furnaces in winter, when not provided with evaporators, is scarcely appreciated. Air at 30° will hold only one-eighth as much moisture as at 100°; and it may therefore be easily understood why the fresh, cold air from without when warmed to the natural temperature of the human body, and holding only one-eighth of the moisture it is capable of retaining, must produce a sensation of painful dryness. The trouble is enormously increased when air at zero without is heated to the temperature of red-hot iron without any provision for supplying moisture.

Ventilation in Summer.—When the temperature is nearly the same both in and out of doors, a window thrown open affords very small change in the air of the room, as little or no current is produced through the

* The French experiments of Deville, Frost and Morin, to show that carbonic oxide permeates red-hot cast iron, and the proof that has been furnished that wrought iron is not proof against its passage, indicate at most that the quantity of gas which can go through a heavy, compact, metallic plate, must be exceedingly small, and the results are still doubted by some scientific men. But even if thoroughly established. they need form no objection to stoves or furnaces, which should never be red-hot. The tendency of the draft is to draw all currents from crevices or openings, inward and up the chimney, and it is only a reversed draft that would throw them into the room.

window, except in strong wind. School-rooms and public halls are for this reason insufficiently ventilated in summer, unless additional provision is made for this purpose. The foul-air shafts will not accomplish the object unless a current can be produced within them. There are two ways of creating this current. One is to place a very small stove at the bottom, which will heat the air above, and soon cause an ascending column, and the other is to place an Espy, a Mott, or other ventilating cap, at the top, above the roof, when the wind will nearly always afford some current, and whenever there is wind, whether fire or not, motion will be imparted to the air in the shaft. The chimney-caps are the simplest, require no attendance or fuel, and should always be kept on the summit of all chimneys used as air-shafts.

Dimensions for Foul-Air Flues and Ducts.

It was shown in the early part of this article that every person should have at least 20,000 cubic feet of good air to breathe in 24 hours. The flues for carrying off foul air should be equal to the conveyance of this amount, to be replaced by the fresh air which would at once take its place if proper access were provided for it to the rooms.

The currents produced in shafts will vary with their height, and with the heat imparted to the air within them, which should not be less than 10° above the unheated air without. The velocity will vary from 4 to 7 feet per second if heated artificially; and it will vary indefinitely with the force of the wind when moved by a ventilating cap at the top. Under ordinary circumstances, and in cold weather, when artificial heat is used, we may put the average velocity of the air in the shafts at 5 feet per second—more in large ones, and less in small ones. A shaft equal to a foot square would therefore discharge 5 cubic feet per second, 300 per minute, 18,000 in an hour, and 432,000 in 24 hours. Allowing 20,000 cubic feet for each person, a shaft a foot square would be sufficient for 21 persons, and one 2 feet square would answer for 84 persons. These figures will readily enable any one to determine the size for any building or number of persons, always allowing more as the shafts are smaller, with more friction of the air against their contracted sides. It would be better, however, to provide against contingencies, and give a higher allowance than 20,000 cubic feet in 24 hours for each person, (which is the lowest possible limit with health and safety,) and to double the area of the foul-air shaft, and allow a square foot for each 10 or 12 persons, especially if the shafts are small. The registers and ducts must have corresponding apertures.

Smoke from Lamps.

A separate provision must be made for the escape of the carbonic acid and smoke from gas-burners, lamps and candles. These noxious gases rise to the ceiling, and should not come down again, care being especially needed in mild weather when there is no fire, and when the air of the room

is more nearly stagnant. For this purpose an opening should convey these gases directly into the chimney or air-shaft at or near the top of the room. This is especially necessary where large lights are burning. A candle (six to the pound) consumes only about one-half or two-thirds the oxygen of one person, and manufactures a corresponding proportion of carbonic acid; but a medium gas-burner, or a large oil lamp, consumes as much air as five persons.

Ventilation in Workshops.

The following mode of withdrawing disagreeable or unhealthful odors from manufacturing rooms, to prevent the workmen from inhaling them, is

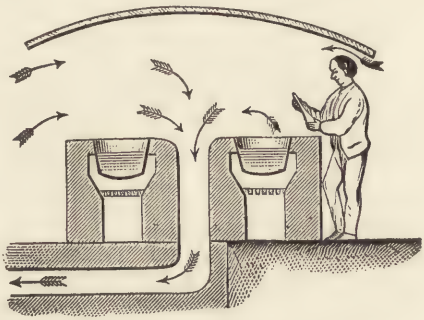


Fig. 209.—*Ventilated Workshop.*

given by Arthur Morin, and it serves to show how currents may be controlled by the use of air-shafts. In the cut (fig. 209) two vats are represented, between which a strong air current is created by connection with a heated shaft, and none of the fumes reach the workmen, being carried down as fast as produced.

Simple Test for Air.

As already stated, the air of rooms should never contain more than eight parts of carbonic acid in ten thousand. The following simple test for such air is given by Dr. Angus Smith: Fill a half-pint vial with pure water (rain water) and empty it in the room where the air is to be tested, by which the vial will be filled with the air of the room. Then pour into the vial half an ounce of lime-water, and shake it thoroughly. If it remains perfectly transparent, with no trace of milkiness, the air does not contain more than eight parts of carbonic acid in ten thousand. In well ventilated rooms with few inmates, the lime-water will commonly remain perfectly clear; in crowded and badly ventilated apartments it will at once become turbid. Breathe through a tube into the lime-water, and it will become still more milky, showing the large amount of carbonic acid always

thrown out from the lungs. The milky appearance is caused by the carbonic acid combining with the lime of the water, and forming the white precipitate of carbonate of lime.

Amount of Air Breathed.

It has been already stated in this article that an average of about 24 cubic inches are inhaled at each breath, although this quantity varies much with the effort made in filling the lungs. The experiment is easily tried by the following simple apparatus: Fill a fruit jar with water, and place it mouth down in a pail half filled with water. It may be supported on three small tumblers, as represented in the cut, fig. 210. Procure a tube about a foot long, bent as shown in the figure, and a quarter or third of an inch calibre. It may be of glass, lead or tin. Then, closing the nostrils, breathe a medium breath through the tube into the inverted fruit jar. It will rise in the form of air at the top, and show the amount of air thrown out of the lungs.

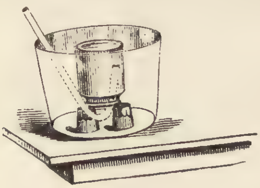


Fig. 210.

General Conclusions.

1. For common living rooms, occupied by a few persons only, and heated by a stove or warm-air furnace, a small, open fireplace or grate will give sufficient ventilation to the room; it will add to the cheerful character of the apartment, afford additional warmth in cases requiring it, and obviate the necessity of heating the rest of the room to so high a temperature as without it.

2. In other cases, where rooms are heated by a furnace, a large register set at the floor in the chimney which carries up the smoke from the furnace or kitchen, will afford good ventilation for rooms occupied by few persons.

3. In school-rooms or halls densely filled with people, a large air-shaft heated inside as already described, will be essential; and an area of the cross section of the shaft large enough for ten square inches for each person will be none too much.

Things to Avoid.

1. Stoves and furnaces so small that they must be heated red-hot in order to get warmth enough for the rooms.

2. Dry air from furnaces; to be prevented by a free evaporation of water in the air chamber, which should be about 8 or 10 gallons in cold weather for a room or rooms containing 3,000 cubic feet; less when the weather becomes milder.

3. Placing warm-air registers near doors, where the warm currents may be swept out of the room without warming it at all.

4. Too small shafts and air ducts. In a school-room containing fifty

students, which had a fresh-air pipe only two inches in diameter, nearly every one suffered from headache. The fresh-air pipe should not have been less than twenty inches or two feet square, and the ventiducts correspondingly large.

5. Receiving "fresh air" for furnaces from cellars and basements, instead of from out-doors in suitable trunks high enough above ground to prevent dust from entering.

6. Allowing the fresh air trunks of furnaces to become receptacles for rubbish.

7. Placing foul-air ducts at ceilings instead of near floors.

8. Never warm a foul-air shaft by heating it at top, but always at the bottom, to give force to the whole column of warm air.

9. Air ducts should never terminate in a close garret, where the air cannot escape.

OSAGE HEDGES AT THE WEST.

By C. G. Taylor, Galesburgh, Illinois.

HAVING HAD MUCH EXPERIENCE in hedge culture for the last twenty-five years, I will try to reply to your inquiry. Though in soil and climate the East differs from Northern Illinois, the main essentials of treatment there need vary but little from ours here.

In 1849, I helped set a hedge row of 120 rods, then supposed to be the first, north of the centre of Illinois. The plants cost $20 per 1,000, besides the freight of some 200 miles, using 2,000 plants for the 120 rods. That hedge is yet in good condition, though it has gone through many manipulations. Prof. J. B. Turner of Jacksonville, Ill., claims to be the originator of the use of the Osage orange tree as a fence hedge. We are at least taught to yield to him the honors. What would be the condition of our Western farmers to-day had we been deprived of this tree (as it truly is a tree of large growth when left to its natural habits) in fencing our prairie farms? The many thousands of miles now in practical use show the benefits it has conferred when properly controlled by the experienced hand. At first our prairies were settled near the groves or belts of timber skirting the rivers and small streams, where timber could only be found for the log cabins and a few rails for fencing. The limited amount was soon exhausted, or held at so high a figure that the new comer with his small capital must resort to a substitute of some kind. Prairie grass sods were cut and laid in tiers some three feet high, with the soil from under where the sod had been taken thrown on the back side, thus forming a ditch of some two feet deep, as shown in fig. 211. Many fields were fenced in this way. Some who could buy a few oak or black walnut trees, would

saw them five feet long and split them into stakes, as small as they could, and drive them into the tough sod, in straight rows, leaving them level on top. They then used a narrow strip of pine board on top by driving a tenpenny nail through into the top of each stake—fig. 212. The sod fence furnished a nice place for the sportive horned animals, in amusing themselves in making the *dirt fly*, making gaps difficult to mend. The stake fences would soon rot at the ground, and blow over with the wind, and being made of small material, lasted only for a few years.

Fig. 211.—*Sod Fence—Section.*

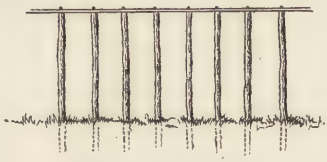


Fig. 212.—*Stake Fence.*

As the country was approached by railroads, a rush of new settlers poured in to buy our cheap lands. Boards from the lake regions via Chicago were furnished. Native oak and black walnut posts were at hand. In this way our farms miles away from growing timber were fenced. Pine lumber was also furnished in rafts from the Wisconsin pineries. Soon our sod and stake fences were gone and among the past. The question was often asked, where will the supply come from twenty-five years hence? What for the future? Wire fences were introduced. Many were the advocates for this new kind of fence. Little lumber was needed, and that only for posts twenty feet apart.

Among the strong friends of this fence was Horace Capron, formerly Commissioner of Agriculture, who worked and wrote much in its favor. Many believed that a new era had dawned upon the prairie farmers. Thousands of miles were put up. Where all the wires were kept in place, which required much watching, crops were protected from cattle and horses, but no real defence was furnished from hogs and sheep. At this time there are only fragments of wire fence left—fig. 213.

Fig. 213.—*Remains of Wire Fence.*

As the northern pineries could not always last, something more was needed. The vast prairies of the Western States containing several millions of acres of the richest land in the world, must be fenced with some cheap material, within the means of small farmers, or their lands were destined to fall into the hands of heavy capitalists, to be laid out into large

tracts similar to those in England. But our small Yankee homes must not be broken up in this way. Each must be the lord of his own home. Now when the new settler comes he finds the section corners established by the government surveyor, sometimes miles away from a single growing tree, or from the sight of one. He finds the corners of his half or quarter section, and puts up his buildings according to his means. He buys his posts and boards, or gets his small stakes to drive in the ground, putting his fence six feet within the road limits, as by "law provided," or on lines joining his neighbor's six feet on either side of the true line, as by agreement between the parties, and prepares the ground and sets the hedge. In the newer States the practice now is the following:

As soon as possible break the prairie sod some twenty feet wide all around the quarter section (160 acres, and there are many farms no larger), so as to fit the ground for the hedge row. The hedge for inside fencing is often grown by having no fence by the side of it to guard it from being disturbed by domestic animals, except in fields used for pasture. Then the hedge is set on the opposite side of the wood fence. When grown to afford sufficient protection of itself, the wood fence is removed to do like duty on some other part of the farm.

On my farm in Rock Island county (now sold) I set with my own hands 840 rods of Osage hedge plants. About one-fourth of them I raised from seeds which grew from a few trees I allowed to grow without trimming, around my milking yard. I commenced to upturn the prairie sod in 1853. In 1866 I had it divided into seven fields. During this time I had used small split stakes, as described above, and common post and board fence to guard and protect the hedges up to an age and fitness to "turn out," as we express it, when the hedge is a hedge, or full protection. I had put up good, plain farm buildings; the old wooden fences were all gone, using no wood except for barnyard and dooryard purposes, gates and gate-posts. I had of living fences over two and a half miles, including the hedge around a ten-acre orchard, so perfect that if anybody wanted fruit, there was no other way to enter the orchard than by the front gate. In the year 1866 after a residence of thirteen years, I received the first premium on my farm from the State Agricultural Society.

It is not uncommon in Illinois and Iowa to find farms of 160 to 320 acres perfectly fenced with nothing else than the Osage orange. Boards and pickets are only used about farm buildings. Thus from my long experience and present observations I will try to present, in as brief a way as possible, the way now practiced to produce the best hedge.

As I have had no other soil to use than that of the prairie, which is free from sand and stone, I cannot speak of other soils, but conclude that the Osage orange will grow well where the apple tree will. The ground for the hedge row must be in perfect order. A good way to do is to plow a strip in the fall about twelve feet wide, and leave the last or centre furrow a foot or more deep. In the spring, just before setting out time, about

the middle of May, when the ground is warm, commence with the plow in the centre, and turn back the ground, forming a single ridge. Harrow well. With a shovel plow make a deep furrow exactly on the line, and with a hoe take out all lumps or anything else. Draw a line over the centre. Select plants of an even size and vitality, and stand them in the furrow, the tops leaning slightly on the line where red threads are tied, one foot apart. With the hoe the roots are rapidly covered, and the earth well pressed down with the foot, care being taken to have each plant stand erect and about four inches above ground, as represented in the cut, fig. 214. Cultivate as carefully as a row of corn should be. As I have known young hedges to be injured in spots by the frost going below the roots in winter, (there is danger if a fence is not near by to gather the snow,) cover the young hedge with straw, coarse manure, or by throwing up on each side several furrows of earth. In the spring clear all away.

Fig. 214.—*Newly Set Hedge.*

The treatment for the second year is simply to cut off in the spring all above one or two buds on each branch, and to leave all level on top to the height of some two or three feet. This trimming is done by using hedge shears. We now have it as represented in fig. 215. The treatment for the second year is the same in cultivation. No weeds or grass sods are allowed to interfere, in order to have the growth of all the trees alike. The reason that it is necessary to leave a bud at starting of the growth for the second year, is that the small tree wants leaves wherewith to draw support from the atmosphere. Each of these buds will throw out a lateral or limb.

Fig. 215.—*Second Year, before Trimming.*

Fig. 216.—*Second Year, after Trimming.*

In the spring of the third year we start as shown in fig. 216. Clean culture is strictly observed. No trimming is needed this year.

Fig. 217.—*Spring of Fourth Year.*

Fig. 218.—*The Same after Trimming.*

In the spring of the fourth year we have it as represented in fig. 217, as grown the year before. Some of the limbs are six to eight feet high. With the use of the hedge shears we cut back as represented in fig. 218. For the fourth year's growth we start as in fig. 218. In August, as soon as some of the limbs are eight to ten feet high, too high to reach with the shears, we use a hedge knife. The handle is some three feet long, the blade a foot or

Fig. 219.

more long and two to two and a half inches wide, tapering to a point at the end. The edge is curved a little to prevent the limbs from moving away from the operator on being struck—fig. 219. At this trimming we only cut away limbs of the most rampant growth, and crooked snarls.

In the spring for the fifth year's growth we find it as in fig. 220, trimmed to fig. 221. From this (fig. 221) we start for the fifth year. By this time our trees are six or seven feet high, and from one to two inches in diameter at the ground. In August of the fifth year

Fig. 220.—*Spring of Fifth Year.*

Fig. 221.—*Same after Trimming.*

Fig. 222.

we head in by taking off all side limbs up to six or seven feet, more closely than in fig. 221 ; resembling fig. 222.

We now have a row of trees resembling a row of cornstalks stripped of leaves with the tassels all complete. During the next spring after the four years' growth, with trees from two to three inches in diameter, we are prepared to commence and to connect it into a hedge. With heavy buck-skin mittens and a sharp hatchet we commence at one end of the row by hacking a tree half off or more, close to the ground, and bending it over in a straight line with the row, so that the top will be about three feet from the ground. As fast as the work is done, stakes are driven into the ground in the hedge row, from four to five feet apart, and as the trees are bent over they are braided alternately on each side of the stakes. In this way every tree is directly over the others. After all is laid and carefully woven, and each at a uniform distance apart, the few straggling top limbs are cut away. As these small stakes are unsightly to some, every fifth or sixth tree is allowed to stand to braid by, and to keep the hedge true in place. This is cut off on a level with the top of the hedge row. In this way the

standing stump grows very vigorously. Of the two modes, I prefer the stump way, as it adds more to the beauty of the hedge, and is more firm than a stake. Where stakes are used they can be taken out after the first year, as the new limbs are very compact, and as they grow they lap by and grow up between the bodies, somewhat resembling a willow basket. It is not uncommon to count fifty limbs sprouting out of a single tree the first

Fig. 223.—*Laying the Trees.*

year after being lopped. No trimming is needed the first year, but clean culture is important. Each year after the first lopping cut back within about six inches of the previous year's growth. After carefully lopping and properly weaving every tree, we have a hedge that is a beauty, and when in leaf, skirting our fields, doubly so.

Fig. 223 sufficiently represents the hedge after being lopped and made ready for the sixth year's growth. Fig. 224 is in the fall of the sixth year's growth.

From each stub near the ground several sprouts will come up. They

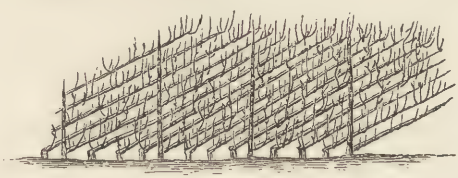


Fig. 224.—*The Finished Hedge.*

too will, as they grow, weave in between the slanting tree bodies. As the roots of the Osage naturally grow deep in the ground, care must be taken to have the hedge row well underdrained on land that is inclined to be wet. No outside sprouts away from the base of the tree, from the roots, ever appear, as some have erroneously supposed. When the hedge is built as described above, it occupies no more land for a few years than a common post and board fence. In August or the first of September of each year shear the sides, and keep the top level.

With a little care a hedge can be grown close to a gate post. Hedges made in this way have no gaps, and are found a perfect barrier to all domestic animals.

Cost of Hedge and Details of Work.

The cost of growing an Osage hedge to five years, when ready to plash, is shown by the following figures :

The cost of preparing the ground is very little where there are no stones to hinder the plowing. If there are, they must be all taken away, at least where the line is drawn, by the side of which the plants are placed at the time of setting out. Where there are no stones to be disposed of and a stubble ground is used, one plowing by turning to the left, and leaving the last furrow exactly on the desired line will be sufficient, and the furrow should be a foot deep or thereabouts, as a deep, mellow bed is needed for the young plants. This work can be done in the spring; if delayed till the fall, which is a better time for the first plowing, the frost pulverizes and makes the ground mellow. Just before setting the plants in the spring, commence to plow by throwing the furrows back by turning to the right. Passing twice may be needed to form a slight ridge. Twelve feet is wide enough for the ridge, which should be finely harrowed. If a strip is desired, now occupied by sod, fall plowing is the best, as the sod will fairly rot if stirred early in the spring, in time to set the hedge row. I think that 160 rods of ground, free from stones, can be put in the best order by one man and his team in one day's work—all told, say $3. One day's work with the hoe in cleaning and straightening the furrow made by the shovel plow, ready to draw the line for setting the plants, $1.50. Total first year, 160 rods, $4.50.

Second Year—Cost of Plants and Setting.—Usually nurserymen buy the seeds of seed dealers, who in the West buy largely from Texas, the home of the Osage. There the oranges are gathered from the native trees, rotted, and the seeds washed out from the pomace, dried and made ready for the market, I do not know the exact process of soaking the seed preparatory to planting, only that it takes several days, as the shells of the seeds are very tough.* The drills are prepared to receive the seeds, as a gardener drills for raising peas. The rows are two feet apart, so as to be cultivated with a horse-hoe or cultivator geared for the purpose. The growth the first year varies from two to three feet high. After the leaves are off in the fall, with a scythe or shears cut off within about four or five

* The seeds I used of my own raising were kept in the fruit in barrels in the cellar during the winter. In the spring, in May, they were mostly rotten. As it was very difficult to separate the seeds from the rotten pomace, I dropped them as evenly as I could in the trench rows. Those oranges that did not rot I cut apart, leaving one or two seeds in each piece. I dropped these also in the trenches, covering them all some two inches deep with very fine, mellow soil. In this way the seeds were already soaked, at least had never dried. All sprouted and were up in ten days, and made better plants than any I ever bought. Several grew over three feet in height.

inches of the ground, as a nurseryman does his seedling apple roots for grafting. Assort and tie into bundles of one hundred each, and bury in pits to keep moist during the winter, or in boxes of soil placed in cellars. In the spring these are sold to customers. During the last fifteen years or more the price has varied from $2 to $3 per 1,000. After the ground is made ready in the spring, and the plants assorted so as to have equal size and equal vitality, a man with a boy to place the plants at the side of the line, as previously described, can put in the row one-half mile (160 rods), and do it well, in one day. Sixteen plants to the rod, 160 rods, is 2,560 plants, costing, at $3 per 1,000, $7.68; labor for man and boy, $2.25—total cost for the second year, $9.93.

Cost of Cultivation each Year for Five Years.—A little more cultivation than for a row of corn is required, as the space is six feet each side of the hedge row. Cultivating and hoeing twice during the season will be —two days' work with a man and his hoe, one with horse and cultivator, $4.

Cost of Trimming.—This is stated in table published below.

Cutting Back, Staking and Plashing.—If the stems and trunks have been kept free from limbs, as previously described, two men being employed to bend the tree, the other using the hatchet, or a light, thin-bladed, sharp axe, they will plash and properly weave in between the stakes, or where one tree in five is allowed to remain uncut at the ground to use as a stake, 40 rods in a day, at $3—four days for 160 rods, $12.

Eighth Year.—After the hedge has finished increasing in height, &c., it is kept in form by side and top trimming for many years. I know of many that are ten years after plashing, fifteen years in all, that remain perfect barriers. As yet I have seen none requiring a second plashing. Two careful trimmings a year will keep all right.

Ten or fifteen years ago this mode of plashing was introduced, and now all our best hedges are of this pattern. A good cattle fence can be made without plashing, and do very well. But in the old way more or less of the plants, or trees even, will be harmed. The weaker are overcrowded and die out, leaving open places, soon made larger by the passage of cattle and hogs. By the plashing system the hog is mastered, for once at least. At the time of plashing, the trees may be eight or ten feet high even, and will better weave in between the stakes.

Recapitulation.—Total cost for 160 rods for first five years, including plashing and weaving for the sixth year's growth:

Tilling the ground for planting in perfect order,	$3.00
One day's work in cleaning out and straightening furrow,	1.50
Cost of plants and setting them out,	9.93
Cultivating five years, $4 each year.	20.00
Trimming the second year. 160 rods, two days' work,	3 00
do. third do. do. three do.	4.50
do. fourth do. do. four do.	6.00
do. fifth do. do. five do.	7.50
Cutting back, starting and plashing,	12.00
	$67.43

It must be understood that all this work has been done in its proper season. If not done then, as in most other things, more work is needed to repair delays.

It must be remembered this hedge has been protected on one side by a wooden fence, (not a stone wall, as that would shade it too much,) and neither cattle nor hogs were allowed to pass over it by getting between the hedge and wood fence while growing, ready to plash. After plashing they may try it at their pleasure, if pleasure it be.

I have followed my own experience in this statement, and carefully consulted with a neighboring farmer, who is an old resident among the first of us in Illinois, and who has done much at hedging. He fully endorses all I have said. I think that one-half of all the fences in Northern Illinois and Eastern Iowa are Osage, and all the best are plashed.

THE LILIES.

THE GENUS OF THE LILY contains some of the most showy and magnificent of all ornamental plants. The more common sorts are hardy, and will thrive in almost any soil if rich enough, and some of them grow freely under the shade of trees. Others require protection in winter. The following are some among the finest and most esteemed sorts :

GOLDEN-BANDED LILY (*Lilium auratum*), fig. 225, is a magnificent species from Japan. The flowers are often eight or ten inches in diameter, and have in extreme cases been found a foot in diameter; in color they are nearly white, studded with spots of crimson, and with a broad yellow band down the middle of each petal or sepal. The bulbs require a dry bottom, and should never be planted less than six inches deep, where they should remain several years without removal. Strong, well established plants have borne a dozen or twenty flowers, and it is said that in England a hundred flowers have been seen on a single plant. When first introduced, bulbs were sold at twenty-five dollars each.

Fig. 225.—*Lilium auratum.*

JAPAN LILY (*L. lancifolium*), is perhaps the most beautiful of all the genus. Vick says of it: "No description can do anything like justice to these flowers, or show the beautiful frost-like white of the surface, glistening

like diamonds, or the rubies that stand out on the surface." The varieties called *speciosum* and *rubrum* are nearly or quite identical ; *roseum* is a little lighter ; and *album* white. All the varieties are very fragrant. The bulbs are hardy.

Fig. 226.
Little Turk's Cap Lily.

Fig. 227.—*Meadow Lily.*

LITTLE TURK'S CAP (*L. pomponium*) — fig. 226 — grows two or three feet high, with numerous very narrow leaves, and rather small, scarlet, nodding flowers, marked with black dots inside, the segments of the flower rolled back so as almost to touch at the points. This lily is less striking than many others, and is less cultivated.

MEADOW LILY (*L. canadense*), fig. 227, although less brilliant than some others, is remarkable for its graceful form, and as it grows and blooms freely in grass fields, it would succeed in gardens or door-yards without care, if the bulbs were removed from their native localities after the blooming season is over, but they do best in rich soil. There are red and yellow varieties.

Fig. 228.—*Lilium superbum.*

LARGE TURK'S CAP, OR SUPERB LILY (*L. superbum*), fig. 228, resembles the last named, but the plant is taller, and the flowers larger and more numerous. It has sometimes grown 7 or 8 feet high, while it has often borne 10 or 12, and occasionally 30 or 40 brilliant orange-red, spotted flowers. The sepals are strongly revolute. It is found in its native woods and marshes from Canada to Georgia but is not very common. It succeeds best in a deep, rich, peat soil.

Fig. 229.
L. philadelphicum.

THE WOOD LILY (*L. philadelphicum*), fig. 229, is common in borders

of woods throughout the country, and is therefore one of the best of all flowers to plant in the shade of trees, although succeeding better in open ground. It usually grows about two feet high and bears a solitary, erect, brilliant reddish-orange flower, or sometimes a few together.

BROWN'S JAPAN LILY (*L. japonicum*, var. *Brownii*,) fig. 230, has a large fragrant flower, white, tinged with purple outside; broad funnel-

Fig. 230.—*Brown's Japan Lily.*

Fig. 231.—*Daurian Lily.*

shaped, five or six inches long. The plant is rare and rather expensive, and is slightly tender.

ORANGE LILY (*L. bulbiferum*, var. *aurantium*,) is a common, very hardy plant, often seen in gardens, and among the earliest, blooming in June. It grows about two or three feet high, the stem straight, furrowed, and spotted with purple, with a cob-web like down on the upper part. Small bulbs are often borne in the axils of the upper leaves. The flowers are in an umbel; brilliant orange-red. This species is variable, and runs into varieties.

THE DAURIAN LILY (*L. dauricum*, known also as *L. pennsylvanicum*,) fig. 231, resembles in form of growth the Orange lily, but bears no bulblets in the axils of the leaves; the flowers are brilliant red, three or four inches in diameter, are less dotted than the preceding, and the plant blooms a few weeks later. It is a native of Eastern Asia, and appears to be little known to cultivators.

YELLOW LILY (*L. croceum*), fig. 232, is nearly allied to the Orange lily, and by some botanists is regarded as only a variety. The upper leaves are more spreading, the petals more distinctly clawed, and it blooms later.

Fig. 232.—*L. croceum.*

Fig. 233.—*Dwarf White Japan Lily.*

The stem grows from four to five feet high, and never bears the small bulbs. The flowers are from ten to twenty on a stem, and of a brilliant orange yellow. It is hardy, and worthy of cultivation.

DWARF WHITE JAPAN LILY (*L. eximium*), fig. 233, resembles *Lilium longiflorum*, of which it is regarded as only a variety. The common variety of *L. longiflorum* is one of the most beautiful of lilies, the flowers being pure white, five or six inches long, and very fragrant. The plants are small or only a foot or two high.

Fig. 234.—*Common White Lily.*

COMMON WHITE LILY (*L. candidum*), fig. 234, is remarkable for its pure whiteness and its fragrance. It is perfectly hardy, and the plants continue to increase without care, as they remain in the ground year after year, throwing out new bulbs.

CHALCEDONIAN LILY (*L. chalcedonicum*), also called the Scarlet Martagon, bears beautiful scarlet flowers, remarkable for the regularity and graceful form of its reflexed petals. It is rather small in size, but brilliant in color. The bulbs should be planted rather deep, slightly mulched the first summer, and with a covering of pine needles or dry leaves in the winter.

TIGER LILY (*L. tigrinum*), extensively cultivated and well known, with large, reddish-orange, conspicuously spotted flowers. The stem grows from three to five feet high, and the plant is of remarkably easy cultivation. The upper leaves bear small black bulbs in the axils. It is valuable for late blooming.

THE MARTAGON LILY (*L. martagon*), has small white, yellow, red, and variously tinted flowers, which are fragrant; petals revolute or rolled back, and are very thick and firm. It is of easy cultivation.

THE WASHINGTON LILY (*L. Washingtonianum*), fig. 235, was introduced only a few years ago, but has now become extensively cultivated in English gardens, and is becoming known to florists in this country. It was brought from California. The flowers are at first pure white, with a few

Fig. 235.—*Washington Lily.*

Fig. 236.—*Great Indian Lily.*

small lilac dots, open funnel-shaped, and two to two and a half inches long. As they become older, they are tinged with reddish purple inside, and finally to a deep purplish pink. The bulbs should be planted at least six inches deep.

GREAT INDIAN LILY (*L. giganteum*), fig. 236, is a tall plant, sometimes two inches thick at the base, the leaves broad and cordate, the lower ones over a foot wide; the flowers are funnel-shaped, about five inches long, white, tinged with purple inside, and with green outside. This magnificent plant comes from the temperate region of the Himalayan chain, where it is found native at an altitude of from 5,000 to 10,000 feet.

The following kinds are easily cultivated in gardens, or are desirable for their ornamental effect:

For common and easy culture—White lily, Orange lily, Tiger lily, Meadow lily, Martagon lily and Wood lily.

Requiring more care, higher priced, but eminently worthy of cultivation—*Lilium auratum*, Japan Spotted and White lily, *L. longiflorum*, Chalcedonian lily; *L. superbum* and *L. croceum*.

In extensive and rare collections the other species described in this article may be introduced, and some of them may become popular and well-known sorts.

Propagation of Lilies.

The bulbs of lilies are made up of scales, sometimes amounting to nearly a hundred in a single plant, but usually much fewer in number. One-fourth or one-fifth of these may be broken off from the outside without injury to the bulb. The minute latent bulb at the base of each scale may be made, by proper treatment, to develop into a new bulb. If these scales are placed into a light sandy compost, in an upright position, a little beneath the surface, in pots or boxes, with the soil pressed compactly about them, in a greenhouse or warm place in the dwelling, and kept moderately watered, they will in the course of a month or two form small bulbs. The best time for this work is during the latter part of winter. When warm weather arrives in May these pots or boxes may be sunk in open ground without disturbing the new bulbs. On the arrival of winter, cover the whole with three or four inches of leaves. In the spring they may be planted separately, and in a year or two will make flowering bulbs. This is substantially the process adopted by Peter Henderson, and other florists, for propagating by scales.

A simpler mode is to take up the roots in autumn, and pack them closely in a bed, covering with a few inches of leaves. Take them up in the spring, and remove the small bulbs surrounding the stem and imbedded in the mass of fibres; plant them, and they will soon form good bulbs for flowering. This is the easiest and simplest way to increase lilies.

Bulbs in the House.—By the exercise of a little taste a world of pleasure can be derived from the cultivation of bulbs in the house, as they can be used in almost innumerable ways. Hyacinths, narcissus and crocuses may be grown in glasses of water. Pot culture, for general use, however, is quite as good, and a little more natural. A very pretty arrangement is to plant a variety of bulbs in baskets or boxes. Fill the box with sandy soil, and if a little moss broken up finely is mixed with the soil, it will keep it from becoming packed or heavy from frequent watering. The box can then be planted with bulbs, always planting those that grow the highest in the centre, and the low-growing kinds on the edges.

THE LANDSCAPE IN WINTER.

WHILE ORNAMENTAL PLANTING has made rapid progress in this country, there has been one department which has been much overlooked—namely, beautifying the winter landscape. The foliage of deciduous trees, and the bloom of shrubbery and herbaceous plants are gone; but in their place much may be accomplished by the soft or rich or variegated shades of evergreens; by the brilliant display afforded by masses of crimson, scarlet and purple berries, and the graceful tracery seen in leafless branches and stems of silver and golden-barked trees. In the absence of other ornament, an increased fascination is given to these objects, and even when crested with snow their brilliance is rendered the more striking.

Fig. 238.—*Berries of Red Cedar.*

Among the plants and shrubs which may be employed for this purpose, the following are worthy of special mention :

WINTER BERRIES.

The Red Cedar, fig. 238, when it grows with its wild and natural luxuriance, is sometimes profusely loaded with its peculiar hoary and purple berries, which, massed among

its dark foliage, present a highly ornamental appearance. By selecting among the young trees such specimens as indicate a prolific character, and removing them to suitable portions of the grounds, a very pleasing effect is produced.

Prinos verticillatus (known also as *Ilex verticillata*, Winter Berry and Black Alder,) fig. 239, is one of the most brilliant of all our native winter shrubs, and bears a profusion of scarlet berries, which continue through a large portion of winter. It is found in abundance in some of our muck swamps, and by selecting the best, they are easily and safely removed to cultivated upland soil, although flourishing in rich, mucky and rather moist land.

Fig. 239.—*Prinos verticillatus* (*reduced in size.*)

Rhus typhina (Sumach), bears large, dense masses of dark crimson berries, which last through winter and into spring, and if placed in the more remote parts of the grounds, and in front of evergreens, they make a fine ornamental display.

Celastrus scandens, (known by the English name of Bittersweet,) fig. 240, displays clusters of orange-scarlet fruit, which is highly ornamental late in autumn and early in winter, and continuing longer. The opening orange-colored pods (which afterwards become white) display the brilliant scarlet berries. It is a climber, and may be trained to afford a graceful and beautiful display in winter.

Euonymus atropurpureus, or Burning Bush, is nearly allied to the above, and is still more ornamental when filled with its copious crimson fruit, and is scarcely equalled for the scarlet blaze which it presents when well loaded with berries.

Fig. 240 —*Celastrus scandens.*

Fig. 241.—*Mountain Ash* (*reduced in size.*)

The Oak-leaved Mountain Ash is to be recommended not only for its scarlet fruit, but for the beauty and symmetry of the tree, the berries hanging till cut by the frosts.

Some of the wild as well as cultivated species of *Cratægus* bear showy scarlet berries, and if the most productive are selected, and made compact by pinching and cutting in, they become objects of much interest—fig. 242.

The common Sweet Brier (*Rosa rubiginosa*), with compact training, bears an abundance of red berries, which continue into winter.

Fig. 242.—*Cratægus.*

Fig. 243.—*Barberry.*

The common and purple Barberry (fig. 243) bear beautiful racemes of berries, the former scarlet, the latter crimson purple, continuing to hang until spring.

The Bush Cranberry (*Viburnum oxycoccus*), if placed in cultivated grounds, and allowed space to grow, will bear freely of its scarlet berries, remaining through winter.

The Buffalo Berry (*Shepherdia argentea*) bears profuse masses of orange-scarlet berries which continue through late autumn and into early winter. Its growth being rather straggling, it should be placed in the wilder and less formal portions of the grounds, in connection with the Pyracantha Thorn (*Cratægus pyracantha*), as they somewhat resemble each other in straggling growth ; the latter being partly tender, should be placed under the shelter of evergreen trees, where its dense clusters of red berries will present a handsome display.

The Snowberry, with its clusters of snow-white fruit. should not be overlooked, although not lasting into winter.

The English Holly is too tender for our winters; and the American Holly is much inferior in beauty.

Photinia arbutifolia is a handsome berry shrub of California, but not quite hardy in the colder regions of the Western States.

Most of the preceding berry-producing shrubs should be placed in front of evergreens, not only for shelter, but for the strong relief afforded to their brilliant colors. As winter advances, many of them will gradually lose their

gay appearance, and some will be devoured by birds, and for the latter part of winter the beauty of the landscape will depend mostly on evergreens. On grounds of limited extent, evergreen shrubs will be chiefly planted, or the smaller trees ; or if larger growing sorts are introduced, they should be kept within bounds by pinching in or pruning from the outside. Shearing should be carefully avoided, as it gives trees a stiff and formal appearance, but they should be so reduced as to present an irregular and graceful outline. The intermixture of dark evergreens and brilliant berries requires an absence of formality in planting, and they are particularly adapted to an irregular surface, rocky grounds or ravines. Sufficient care and pruning should, however, be given to the latter to induce prolific bearing.

Evergreens.

Among the smaller evergreens adapted to places of limited extent and village grounds are the following :

The Mugho pine (*Pinus mugho*), growing fifteen or twenty feet high, with numerous ascending or creeping branches, the foliage resembling that of the Scotch pine. It is sometimes confounded with the dwarf mountain pine (*P. pumilis*), but differs in shorter leaves and a more upright tree form. The Mountain dwarf pine has a more rounded growth of the tree. A very small variety of the Mugho pine grows only about two feet high. The Stone pine (*P. cembra*) although ultimately attaining thirty or forty feet, grows so slow that for many years it keeps well within bounds, and forms a neat and handsome pyramid, varied by the tufts of foliage on its outline. The Dwarf White pine (*P. strobus*, var. *pumila*) is a bushy variety of the common white pine, of a compact form, growing from six to ten feet high. Another larger variety, known as the *compacta*, is double the size of the last named, making an annual growth of three or four inches, and forming a beautiful tree.

There are several varieties of the Norway spruce (*Abies excelsa*), of various sizes, from the Pigmy Fir, a foot high, to those that become small trees. The common Norway spruce may be kept to the size of a small tree or shrub by continually cutting back ; there are however two objections, one of which is the common want of skill and taste required to preserve a graceful natural form, instead of a heavy, formal or stiff figure ; and the other the liability to neglect this cutting back until the tree has grown beyond the limited bounds allotted to it. The White spruce (*Abies alba*) forms a handsome tree of moderate size, growing forty or fifty feet high ; and there is a dwarf variety about the size of a currant bush. A more beautiful tree is the Black spruce (*Abies nigra*), which has less stiffness and more grace of outline than manv other spruces ; it sometimes attaines a height of seventy feet. The Red spruce much resembles the Black, and while some regard them as distinct species, others look upon them as only varieties.

There are some other rarer firs worthy of attention, among which are the Cephalonian fir (*Abies cephalonica*),and Nordmann's fir (*A. Nordmanniana*),

the latter being regarded by J. Hoopes, author of the Book of Evergreens, as the most beautiful and reliable of all the new sorts.

Among the larger pines, none can exceed, and few equal, the common White pine (*P. strobus*), and the Austrian pine (*P. austriaca*), while the native hemlock (*Abies canadensis*) is one of the finest of all our evergreen trees, when allowed full space to grow and develop its graceful form.

Turning again to some of the smaller evergreens, we should not omit to mention the Siberian Arborvitæ (*Thuja occidentalis*, var. *sibirica*), and the Red cedar and common Juniper. The Tree Box, although a slow grower, forms a beautiful broad and dense mass of green foliage, and becomes one of the best winter ornaments. Dwarf pine (*Pinus montana*), a European species, is perfectly hardy, and easily transplanted, and grows in a dense rounded form ten or twelve feet high.

Among the trees and shrubs which contribute, by the color of their bark, to the attractions of the winter landscape, are the Golden-barked Willow, White Birch, the Golden Ash and the Red-twigged Cornus (*C. alba*), and if well relieved by a dark background of evergreens, become objects of much beauty and interest.

The leaves of the White Oak, and some other species, often remain through winter, and present various shades of red, crimson and purple. The young trees hold their leaves in rich masses; from older trees they fall in autumn.

By a due share of attention to these winter ornaments, there is no necessity whatever for the bleak and dreary appearance of which so many complain; and even the bare branches and the shining buds which invest them, will become objects of study and delight. A proper blending and contrast in various shades of different evergreen trees may be made to give additional charms to the plantings of the grounds. These examples are cited as specimens of what may be accomplished by proper care and attention.

Small ornamental undergrowth beneath the trees and larger shrubs should not be overlooked, as it gives a beautiful effect late in autumn early in spring, and when the ground is bare of snow in winter. Evergreen shrubs like the wild Yew; such small plants, with broad, thick, evergreen leaves, as the *Chimaphila*, and the evergreen ferns; the whole surface carpeted with such species of moss as give a soft, green surface, all add greatly to the effect. Among the evergreen ferns very few may be mentioned. The common Polypody (*Polypodium vulgare*),

Fig. 244.—*Polypodium vulgare.*

fig. 244, is rather small, very hardy, and will grow on or among rocks. The Hard Fern (*Aspidium acrostichoides*), fig. 245, is common along wooded ravines and hillsides, and is a large handsome plant; also the *Woodwardias* and *Aspleniums*, and several *Aspidiums*, which may be easily collected in our wild woods early in spring.

Fig. 245 —*Aspidium acrostichoides.*

Fig. 246.—*Helleborus niger.*

Among the flowers which may be made to bloom in early winter is the Christmas Rose, so called, (*Helleborus niger*,) fig. 246, which, if planted under the protection of evergreens, and on the south side, facing the sun, may be often seen in bloom half hid under the snow.

For early spring blooming, even before all the snow-drifts are gone, plant the bulbs of the Snow-drop, Crocus, and Siberian Squill, in similarly sheltered places; and plant such early bloomers among the wild flowers of the woods as the *Claytonia* and *Hepatica*, and they will add greatly to the charms of the grounds while all the deciduous trees and shrubs are yet destitute of foliage, and buds have not begun to swell.

TETHERING AND SECURING ANIMALS.

BY L. D. SNOOK, BARRINGTON, YATES CO., N. Y.

THE PRACTICE OF JUMPING FENCES by domestic animals is an acquired habit, although in a few instances that have come under my observation the impression was made that the habit was hereditary. Be this as it may, it is a reality that they do leap our fences, and the object of this article is to notice some of the best plans and contrivances for keeping them under subjection while at pasture.

First is noticed an improved form of clog or tether, as shown in fig. 247, and is made by connecting, with a chain or rope one foot in length, two round pieces of wood, each one foot in length and six inches in diameter.

The centre of the chain or rope is connected with the leg by a short chain, and a strap encircles the fetlock. The object of this arrangement is to be able to turn horses in a large pasture at noon, or at any time, and prevent them from walking about, or far from the point at which it is desired they should remain.

Fig. 247—*Clog or Tether.*

Another arrangement necessitating slow walking is the use of knee-hopples, as shown in fig. 248 and 249. A leather strap (a harness hame strap will answer) encircles each leg above the knee joint, and these are connected by a chain from three to five inches in length. This plan does not strain the animal; is cheap, easily attached, and is effective.

I have used some of the patented hopples or fetters, but the liability of the springs and other portions to become disarranged has led some to condemn them. A cheap and effective pair of iron hopples is made in the form shown in fig. 250. The part or band encircling the fetlock is of the usual form; one end is closed, and retains an iron ring about an inch in diameter; the other end is left open about one-quarter of an inch, into which, when the band encircles the fetlock, is hooked the ring *B*, the thin and peculiar shape at *R* allowing it to be readily attached. The ring being long, with the inserting part at the side, keeps it from unhooking while in use. The entire length of chain should be about two feet six inches. A blacksmith will charge from $1.50 to $2 for making them.

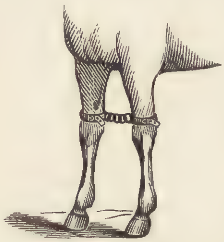


Fig. 248.—*Knee-Hopple in Use.*

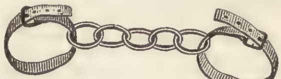


Fig. 249.—*Knee-Hopple.*

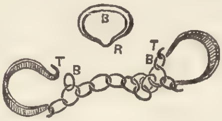


Fig. 250.—*Iron Hopples.*

SINGLE PENDENT POKE.—A poke of this form is simple in construction, easily made, and shown in fig. 251. When made light and of suitable length, it can be placed upon colts one year old, or over, with good results, and without the usual straining effects caused by the use of fetters. It is secured about the neck by an iron bolt *C*, with nut attached; or with a strap, or by a wooden pin made like a bolt, with leather or iron key. A horse-shoe nail is a good key, and is easily bent by hand. A pin of wood or iron is driven in near the bottom, and projects outward about three inches. This catches into the fence when the colt attempts to leap over.

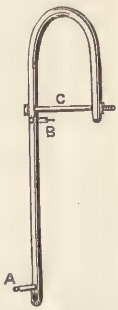


Fig. 251—*Single Pendent Poke.*

In the pendent, and two inches below the bolt *C*, and at right angles thereto, is inserted a wooden pin *B*, three-quarters of an inch in diameter, and projecting three inches, into the end of which a nail is partly driven, and then filed sharp. When the poke is pressed hard against the fence the nail enters the breast, and another attempt is not made very soon. When the animal stands in an upright position the bottom of the poke should not come nearer than one foot from the ground.

DOUBLE PENDENT POKE.—In this illustration (fig. 252) two forms of the double pendent poke are exhibited, that with both pendents parallel is only an extension of the short arm of the bow of the single pendent, and may be made in the same manner, with catch pins, &c. The advantages are that the weight is distributed more evenly upon the neck, and offers more impediment to the jumper than the former. The dotted lines *D D* show another form of arrangement. It may be bent inward at the joint of bolt fastening, then diverging outward, or diverging only below the bolt as desired. This plan offers more convenience to the animal while walking or feeding, and is not liable to injure the knees when moving rapidly. If made from a round stick, unless of quite uniform diameter, the large end should be reduced in size.

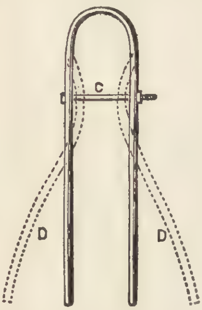


Fig. 252.—*Double Pendent Poke.*

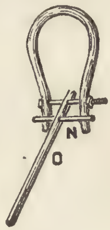


Fig. 253. *Bow and Flexible Projection.*

FLEXIBLE PROJECTION POKE (fig. 253.)—As regards cheapness, this poke compares favorably with either of the two just described, and for effectiveness I think it preferable. In most sections of the country farmers have old ox-bows, or can obtain them of a neighbor at slight expense, and they will be found just the thing for this purpose, with the exception, perhaps, of the ends in some cases being too far apart, which is remedied by tying firmly together and immersing it for half an hour in a tub or boiler of hot water, and then allowing it to dry for a day. After removing the fastening the ends should touch—or at least within an inch or two ; and in use is readily sprung over the horse's neck. An iron bolt passes through the upper end of projection, *O*, and through the bow within five inches of the end. About four inches below the bolt is firmly driven an iron rod, *N*, one-half inch in diameter and seven inches in length, the ends of which set against the bow, keeping the projection at an angle of about 45°. This poke is readily attached, and the bow will not be lost if the remainder is. I have known extremely tricky animals, by a side movement, to throw the end of the projection over the fence, and then leap over with apparent ease, but such cases are as rare as they are provoking.

Bending Bows, &c.—To obtain a desirable, uniform curve in bending bows, a machine or form should be used, and a simple arrangement for the purpose is shown in fig. 254. The ends *B* are made from plank fifteen to eighteen inches wide, shaped in the form of an arch,

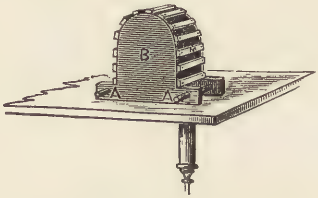


Fig. 254.—*Machine for Bending Bow.*

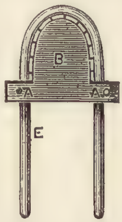


Fig. 255.—*End View of Bending Machine holding a Bow.*

with projections at each side seven inches long and four wide, through which are made holes one inch in diameter, in which loosely fit the retaining bars of wood *A A*. Over the arched portion are nailed strips of boards one foot in length, two inches wide, one inch thick, and two inches apart.

In fig. 255 is shown an end view of bending machine with stick *E* in process of bending. It is frequently desirable to bend dry and seasoned wood. In this case cut it into the desired shape, and either steam for a few hours, or immerse in water for a day or two, until thoroughly soaked, when no difficulty should be experienced in bending. If you form the bow too small, the animal wearing it is inconvenienced, if not distressed thereby; if too large, you have your remedy by winding with strips of flannel cloth, firmly tied in place. Always, and in every case, bend with the cut side inward, which in a measure prevents splintering. The material used is not necessarily confined to any particular kind of wood. Any of the tough, firm, easy-bending woods will answer. If a round stick be used, remove the bark and all projecting knots, and make as smooth as possible, rendering it more convenient to handle, not so liable to wear the hair and mane, or cause irritation. It also seasons more rapidly, and is not so frequently worm eaten.

Bad Education of Stock.—Nearly all the habits of domesticated animals are more or less a matter of education. The farmer who is uniformly gentle, will have quiet stock. The farmer who keeps more stock than he can pasture, usually has poor fences and unruly stock. If the pastures get short, young stock will learn to creep through, or jump over ordinary fences, and one or two escapes will fix the habit indelibly on the memory of the animals which thus escape. No intelligent, judicious farmer would be guilty of raising and selling unruly animals, any more than he would teach his children lying and dishonesty. An animal which cannot be trusted in fields having reasonably good fences is sure evidence of a careless owner at some period of its life.

FUNGI INJURIOUS TO FARMERS.

By Byron D. Halsted, Harvard University, Cambridge, Massachusetts.

IN THE SHORT SPACE allowed for this article, it is thought best not to go over the whole ground in a general way, but rather to treat more in detail a few of the most important species under this head.

The term *fungus* has long been applied to one of the principal groups of Cryptogamous or flowerless plants. As no fungus has anything answering the purpose of leaves, they are unable to take their food in the crude condition directly from the earth and air, and must therefore derive all their nourishment second hand in an elaborated state, either from animals or other vegetables.

The most noticeable among the common species of fungi are the mushrooms and toadstools, but as they usually grow on dead and decaying organic matter, they are comparatively harmless to the farmer and fruit-grower.

All fungi may be said to consist of two principal parts—the vegetative and reproductive organs. The vegetative portion usually consists of a number of minute threads called *mycelium*, which run in all directions through the substance from which the fungus derives its nourishment. The reproductive organs consist of small bodies, which are produced at certain times and places, and are called spores. These spores have the power of germinating when placed under favorable conditions, serving the same purpose for the fungus that the acorn does for the oak.

Without spending any further time with generalities, let us take up first what is commonly called *rust*. As this term is used in a very broad sense, and botanically includes many species of fungi, and often that which is not fungi, and also because the rusts, to the naked eye, resemble each other very closely, in treating one of these species we can give an idea of the whole, and will therefore confine our attention to one of the most common of them.

Wheat Rust (*Puccinia graminis*, Pers.)—The yellow, rusty appearance of the leaves and stalks of grain when they have been struck in midsummer is very familiar, and needs no description. Suffice to say this powder, which brushes off so easily, consists of a multitude of minute spores of the rust plant. To get a clear idea of this plant, let us begin with a spore in the spring, and trace it through its various stages of development upon the stubble and old stalks that have been left in the field. Black leaves can often be found, which at first sight pass readily for weather stains, but in cross section of the leaf or stem under the microscope, the appearance is something like fig. 256, showing that the epidermis of the leaf has broken open, and a mass of two parted spores is protruding. These double spores are

enlarged, one of which is shown at *a*, are dark brown in color, and constitute the perfect spores of the rust plant.

Beginning with these spores in the spring, when the warm, moist weather comes, they germinate by sending out an irregular tube, which produces, in the course of a few days, a number of small bodies, which are called sporidea (shown at *b* in fig. 256), the first spores in the life of this polymorphic fungus. When the spores find their way to the leaves and stalks of the wheat, germination takes place, the spores sending their germinal tubes through the stomata into the tissue of the wheat plant. After a few days of favorable weather, the surface of the plant is raised in spots, soon to become broken, and a yellow mass of spores is produced, giving the familiar color to the grain thus affected, and is the state of the fungus which has received the name of rust. This is the *uredo* form in the history of this vegetable parasite. As the season advances, these yellow, single-celled uredo spores germinate on the grain, and produce, later in the season, the last double and perfect form with which we started.

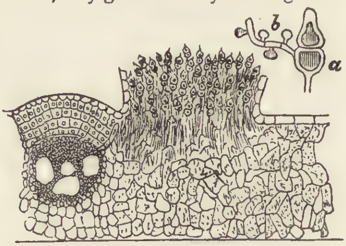


Fig. 256.—*Wheat Rust.*

The time when the greatest injury is done to the grain crop is at the time of flowering and filling of the grain, and is, of course, caused by the uredo form of the fungus. It is just at that time that the wheat plant is well filled with elaborated nourishment for the building up of the grain, and should the atmosphere be warm and moist, the rust rapidly develops, turning this stock of material, which should go to the filling of the head, into another channel, and there is produced instead a vast number of rusty spores.

Knowing the nature and history of this disease, means of meeting it will suggest themselves. The destruction of the perfect spores in autumn, by burning the stubble, would effect much. Only good sound grain should be sown, as the mycelium in the diseased grain will propagate the fungus. The use of strong chemicals for destroying the "germs" has not given flattering results, because the tissue of the parasite is better able to withstand their action than the grains themselves. Owing to the smallness of the spores, the grain-grower, with all precautions combined, cannot hope to entirely eradicate this microscopic pest from his fields when the conditions are specially favorable for its development.

Corn Smut (*Ustilago maydis.*)—Another group of fungi which grows most abundantly on various members of the grass family is, from the prevailing dusty, dirty nature, called smut. Burnt ear, chimney sweep, &c., are names given to these members of the genus *Ustilago*. It is best to treat this subject as was done with the rust, by taking one of the group, as they differ only

in minor qualities, and for this purpose we shall choose the corn smut (*Ustilago maydis*), fig. 257. This fungus, like most of its allies, usually inhabits the grains, changing them, and often the entire ear, into a great mis-shapen mass of black, dusty powder. When the season is especially favorable, it develops on almost any and every part of the corn plant. Sometimes a joint gradually enlarges, and the stalk becomes weakened and bends to the ground ; again the delicate, pendant flowers of the tassel assume the size and shape of walnuts. When the black powder, which is the most conspicuous part of this fungus, is placed under the compound microscope it resolves itself into a multitude of small, round bodies, which are the spores. These spores, when they fall upon the corn plant, germinate, send in a thread and develop much as described in the rust, by branching and absorbing nourishment from the tissue through which they pass. After growing thus for a time, causing the affected portion to enlarge and become spongy in texture, it begins forming its spores in vast numbers, which finally burst through the epidermis and are discharged. The number of these spores produced in a single smutty ear is beyond computation. The great mass of them must fail to find a place to grow, while the few lucky ones come safely through the winter to continue the species.

Fig. 257.—*Corn Smut.*

As far as known there is only one form to this group of fungi, and this makes the story of its development much shorter than that of the rust.

The most effectual means of destroying this disease would be to cut off and burn all parts when they first show signs of being attacked by the smut, and in that way prevent the formation of the spores. As the smut is more a disease of the ears of the grain than the rust, greater care should be exercised in the selection of strong and healthy seed to sow or plant.

To make any steps towards the destruction of the smut effectual, there must be concerted action, and this comes among free and independent farmers only when stern necessity demands it. Until the evil assumes greater proportions, we cannot hope to see the farmers striving as in a common cause against it.

ERGOT (*Claviceps purpurea.*)—One of the most interesting of the injurious fungi is ergot, spurred rye, cockspur, &c. It grows to some extent on a large number of native and cultivated grasses. That on which it is best known, and from which it is chiefly collected for use in medical practice, is rye. This fungus (*Claviceps purpurea*) lives in the grains of the rye, beginning its work when they are quite young, and causing them to assume many times their natural size, finally becoming purplish black in color, of a horny texture and disagreeable odor. This anomolous structure

is composed of the vegetative portion of the fungus, which has fed upon the young seed and transformed its material into itself.

When some of these "grains" are placed in warm and moist sand for several weeks the reproductive organs develop in the form of long knob-like projections, in which the spores are borne in sacs, and these sacs in cavities in the enlarged ends of the projections. The grains of ergot which are used in medicine are simply condensed masses of the mycelium of this fungus, and in this state are capable of hibernating through the winter.

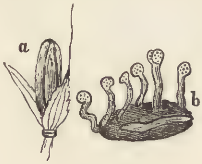


Fig. 258 —*Ergot.*

In fig. 258 is given the enlarged ergot grain at *a*, and one of the same at *b*, where the spores are being produced.

The method of working against this fungus is in destroying the ergoted grains in autumn before they have been allowed to produce their spores. A crop much affected should not be used for seed, neither should the same field be sown to rye the next year.

This peculiar fungus is a powerful poison, and in the hands of skillful practitioners has proved a valuable medicine. In countries where rye is largely eaten, poisoning with ergot, or ergotism, is quite common, and some years assumes the nature of an epidemic, sickening whole communities, causing great pain and often death. This has often occurred in Germany and other countries of Central Europe, but with us there is little to fear on this score, though sometimes it appears to such an extent on the grasses as to injure stock feeding upon it.


Fig. 259.—*Black Knot.*

THE BLACK KNOT (*Sphæria morbosa.*)—The black knot grows upon the plum and cherry trees, and is one of the most destructive of fungi. As its name indicates, it forms black, warty excrescences on the twigs and branches, (fig. 259,) which are very conspicuous in the winter season, when the trees are not covered with leaves. This disease is confined to America, where it has proved a severe pest to fruit-growers. The size of the knots varies greatly, being found all the way from a few lines to several inches in length, with an average of two inches in circumference. The knot does not usually entirely surround the branch, but growing from one side often causes the branch to bend or twist into an irregular shape. The fungus first reaches the cambium or growing layer by

germination of spores on the surface of the branch, or by the mycelium proceeding from a neighboring knot.

In the spring the affected portion of the branch increases rapidly in size, and the mycelium soon reaches and bursts through the bark, so that in early summer the knot has reached its full size, though differing from an old one in being still greenish in color, and solid or pulpy in consistency. As autumn approaches, the knots assume their black color, the inner portions being either destroyed by insects or reduced to a powdery mass, with only the hard outer shell left in place. In this hard crust the spores are borne in cells, always to the number of eight.

The black knot is far from being of recent origin, and has furnished a subject about which vastly more has been written than was known. Many, especially the early writers, held it to be of insect origin, while later others have looked upon it as a vegetable growth, and still others included in its production both these forms of life. During the last thirty years the insect theory has been gradually given up by entomologists, but it still remains for many fruit-growers to accept the knot as being of fungous origin. The proof given by Dr. Harlow in his paper on this subject is very conclusive : "First, the knots do not resemble the galls made by any known insect. Secondly, although insects, or remains of insects, are generally found in old knots, in most cases no marks at all are found in them when young. Thirdly, the insects that have been found by entomologists in the knots are not all of one species, but of several different species, which are also found on trees which are never affected by the knot. On the other hand we never have the black knot without the *Sphœria morbosa*, as was admitted by Harris, and the mycelium of that fungus is found in the slightly swollen stem long before anything which could be called a knot has made its appearance."

With a knowledge of the nature of this disease the remedy at once suggests itself—namely, to cut off the knots, together with the swollen portions of the branches, wherever and whenever they are found. This can be best done in autumn after the leaves have fallen. The knots should be burned, otherwise the spores will ripen the same as if the knots were left on the trees.

THE POTATO ROT (*Peronospora infestans.*)—All known species of the large genus *Peronospora* are parasitic on living plants. The one of most interest to us is that which produces the filthy decay often found in our potatoes. Perhaps no plant has caused more distress to the human family than this microscopic parasitic fungus. But little was known of the rot previous to 1842, when it played so destructive a part in potato culture, only to eclipse its former achievements in 1845, a year memorable in the history of many countries as that of famine, especially in Ireland, where potatoes were the leading source of food for the masses. Since that year the fungus has not been so prevalent, though to some extent found almost every year.

The rot makes its appearance about mid-summer, when the potato plants

are growing the most vigorously, and is first noticed on the under side of the leaves, in the form of a slight frost, rapidly spreading, and turning the foliage brown as it passes along. Like all parasitic fungi, the mycelium is stealing its way through the tissue of the plant, passing from the leaves to the stem, and from the stem down into the tubers.

Fig. 260 represents a cross section of a leaf much magnified, with the fungus running among the cells, and finally passing through a breathing pore, (stoma,) branching very irregularly and bearing the sporangia at their tips. It is this branched exterior portion which gives the frosty appearance to the naked eye when the leaf is first affected. These sporangia fall off on other leaves, and the spores inside soon come out, germinate, and produce new plants in a few hours, and in this way the disease is rapidly spread from leaf to leaf.

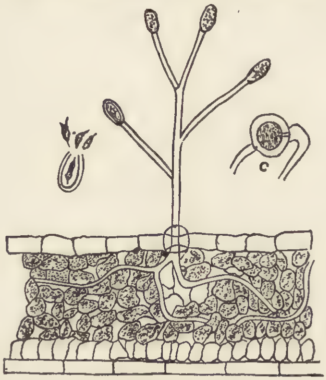


Fig. 260.—*Potato Rot.*

In many other species of this genus a second form of reproductive bodies, called resting spores, is known, and the work of finding them in the potato rot has been long pursued. W. G. Smith of England was the first to describe them, for which he has received a gold medal from the Royal Horticultural Society of England. The importance of finding them resides in the fact that they are the spores which are designed to carry the fungus through the winter. The finding of them, and the place in the potato plant where they are produced, is an important step towards controlling, to some extent perhaps, this dreaded disease. Mr. Smith finds them in the leaves of the potato, and they agree in general structure with those of the other species of the genus. They are sexual, or formed by the union of the contents of two cells. Fig. 260, at *c*, shows the process, one thread ends in a large end filled with protoplasm; this is met by another and much smaller one, which penetrates the coat of the larger one, and discharges its contents into it, after which the discharged one or male perishes, and the other, the female, produces a resting spore.

Some persons have held strongly to the belief that the rot is of insect origin, but they have usually been those who have a deep interest in some "sure cure" or "dead shot" which they wish to introduce into general use. When it can be sown and grown on healthy plants with such certainty as numerous experiments plainly show, it is time to believe it is as much a plant as the one on which it grows.

The farmer is perhaps more interested in the remedies than any farther

details about the fungus itself. Nothing but general suggestions can be given. As far as experience goes, the early varieties do best, as they get through the most critical period of their growth before the fungus appears. None but healthy tubers should be planted, otherwise the parasite will be planted with the potato. Plant on new ground, or if on old, not where potatoes which rotted grew the previous season. Plant on naturally dry or well drained soil. Dig the potatoes as soon as the rot appears 'on the leaves, and thus save what there is, rather than run the risk of losing all, besides propagating the disease. Always burn the tops and all affected tubers. Keep the potatoes in a dry, cool cellar.

With these suggestions, and others which will come to the reader, much may be hoped to be accomplisbed towards diminishing the potato rot; but until we can command the weather, warmth and moisture, the prime conditions for the development of the fungus will be beyond our control.

NOTES FOR GRAPE GROWERS.

Training and Pruning.

GRAPE CULTURISTS are well aware that good grapes may be raised in either of the different modes adopted for pruning and training, provided sufficient space is given for the free growth of the shoots, and for the development of the leaves, and that not too many branches are allowed to exhaust the vine and to interfere with each other. But it is a matter of importance on the score of economy and simplicity in mangement, and of uniformity in growth, to choose some modes in preference to others. The following, kindly furnished by Henry Wood of Westchester county, N. Y., a successful amateur grape grower, is particularly intended to equalize the flow of sap and the growth of the shoots on each wire, by bringing up separate stems from the ground ; and to simplify and improve tbe pruning by renewing all the bearing wood annually. This is effected by care in training upward the shoot nearest the vine, to secure a strong growth to lay in the next year; whereas all the other shoots are allowed to hang free from each other. This method improves the fruit on the shoots thus allowed to hang, and promotes the growth of those trained upward. "The process," says Mr. W., "of pruning is exceedingly simple. It consists in cutting out the last year's bearing wood to the 'heel' shoot, and laying that in its place ; and in continuing to do this every year. Occasionally from accident or tardy growth, this shoot will not be sufficient ; the course then is to spur it and others, until you come to one which will reach out to a point half way to the next vine, or near it. With me the heel shoot is usually long enough for the purpose. My vines cultivated in this way are mostly Concords and Hartfords. They are planted 12 feet

by 14 feet distant. If the ground is good, Concords should be 14 feet apart in the rows, and 8 feet between. My vines do remarkably well, seldom failing to ripen heavy crops of excellent grapes of their kind."

The accompanying cuts show the successive stages of management. At *A*, fig. 261, is the young plant, set in a depression, so that when the buds

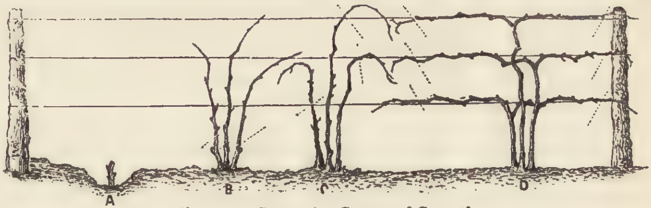


Fig. 261.—*Successive Stages of Growth.*

have sent up three strong shoots (the rest being rubbed off as soon as they start) the hole may be filled level, and three distinct vines be thus obtained, growing closely together, as shown at *B*, which represents the triple plant at the close of the first season. The following spring each is cut down at the places shown by the dotted marks, and a strong shoot trained from each the second season, which will give results shown at *C*; that is, three strong canes will be supplied at the end of the second year. The following spring these are cut at the respective heights intended for them to reach, as indicated by the dotted marks. The horizontal training is now commenced, by leading two horizontal shoots from each vine, so as to supply the three wires, as exhibited at *D*. These may be permitted to

Fig. 262.—*Completed Training.*

bear a few grapes, but the crop should be a very small one. The following spring they are to be cut to about half their length.

Fig. 262 represents, on a larger scale, the vines the fourth and subsequent years; and if the growth has been strong, they will have extended

enough the fourth year to cover the fourteen feet of the wires, but it will often require longer time. Here again, in this figure, the dotted marks show where the bearing vines are cut in spring, after bearing the previous year. The drooping shoots bear the bunches; the long dotted lines indicate the position of the one-year canes, to be brought down to the wires for bearing the next crop.

By this process, each of the three wires will sustain an equal weight of the vines and grapes, without the tendency for the vigor of the single plant to push towards the top.

A Wooden Trellis.

In small gardens where a few vines are raised for family supply, it is sometimes inconvenient to adopt the wire trellis used in large vineyards, which require tightening and relaxing as the temperature of the seasons changes. In such cases a neat wooden trellis is more convenient, and needs no bracing of the posts. We have found the following to answer a good purpose, and to be cheap in construction:

Procure yellow cedar posts 8 feet long, (or longer if to be had,) set them 2 feet in the ground, pounding the earth very compactly about them. Then nail on the horizontal rails, which may be of thick inch boards, 2½ inches wide. We have taken selected hemlock, the thickest that could be found, and had them slit by a machine—or the work may be easily done by hand. They are 16 feet long, and the posts are set at this distance apart. In order to render the trellis stiff and firm, without intermediate posts, we nail two

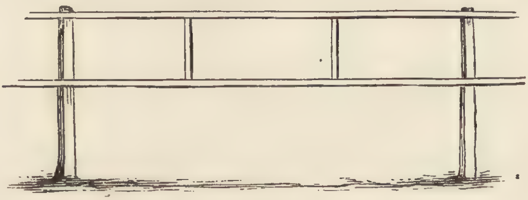


Fig. 263.

upright pieces of lath, as shown in fig. 263, using clinching nails. The upper rail is about 6 feet high; the lower 3½ feet high. The boards are rough, not planed, and when the trellis is completed, two or three heavy coats of crude petroleum (the light is best, penetrating better, out either will do), applied with a whitewash brush, thoroughly soaks every part, and renders them as durable as red cedar. The petroleum gives a light brown color, which is least glaring or obtrusive to the sight. A more finished trellis may be made by planing the boards and painting a light olive, or a light, unobtrusive brown. The rough trellis may, however, be made very neat in appearance, and the cost is about as follows, for ten rods in length: Eleven posts, 25c. each, $2.75; twenty strips of board, 8c.

each, $1.60; setting posts, $1.50; nailing and oiling, $1; total, $6.85, or 68c. per rod.

If a stronger and more finished trellis is desired, three horizontal rails, instead of two, may be employed, with three vertical braces, as shown in fig. 264. By increasing the number of rails and braces, they may be made more slender, and present a lighter and more graceful appearance. Or by making them of 1¼ inch or 1½ inch stuff, they may be correspondingly narrower, and all appearance of heaviness avoided.

Fig. 264.

Adjusting Trellis Wire.—We lately examined a simple and excellent contrivance for stiffening or relaxing the wires of a grape trellis, in the garden of Dr. S. B. Woolworth of Albany, N. Y., of which we give the accompanying representations. Each wire is fastened to the end of a short lever, *A* (fig. 265), which is mode of stout half-inch board, about 2 inches wide and 10 or 12 inches long. This lever is secured to the post *A* by a strong screw at *B*, and this screw serves as a fulcrum or pivot, on which the lever moves when the wire is stiffened or released. In whatever position it is placed, it is secured by a nail *C* driven into the post. This contrivance may be varied by inserting the screw at the end of the lever, as in *A*, fig. 266, and attaching the wire between the nail and the screw. Or, it may be fastened at the lower end, as in *B*, as may be found most convenient, the essential characteristic remaining the same. Any gardener of moderate skill can make a large number in a day, and they have cheapness, neatness and convenience to recommend them. They would not probably answer for wires of great length, but when only a few rods long, they perform all that is required.

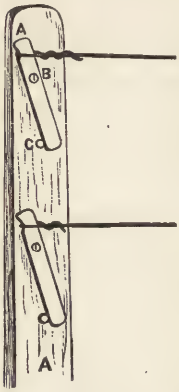


Fig. 265.

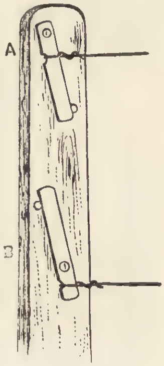


Fig. 266.

Comparative Hardiness of Grapes.—A correspondent of the Rural World gives the following classification of grapes according to their

hardiness : First, or most hardy, Concord, Telegraph, Perkins. Second, or next hardy, Clinton, Hartford, Delaware, Isabella, Catawba, Martha, Northern Muscadine, Ives. Third class, Creveling, Goethe, Lindley, Maxatawney, Alvey.

THE FLEA-BEETLE.—C. V. Riley, the entomologist, says that the larvæ of this little insect, which are sometimes so destructive to the leaves of the grape, are most easily and effectually destroyed by the application of dry lime, thrown on them by means of a common sand-blower or bellows. This is better than lye or soap-suds, and does not injure the leaves.

KITCHEN GARDENING.

RAISING ASPARAGUS.

ONE OF THE ERRORS in asparagus culture is crowding the plants closely together in the bed. A deep excavation is made, which is filled with rich materials, and the gardener, in order to get the most of the narrow space which has cost so much labor in preparing, sets the plants so near together that they crowd each other in growth, preventing their free development. We have urged on former occasions the superior advantages of giving less attention to preparing a deep bed, and allowing more space for their growth. The largest plants we ever saw were those that were thus allowed abundant room, with only the common depth of good garden soil. A gentleman whose garden we have occasionally visited, and who knows well how to provide the finest vegetable luxuries for his family, gives us the following details of his management of asparagus :

The plants in the first place are set about one foot deep ; the shoots in a properly treated soil readily find their way to the surface. (Fig. 267.) The

Fig. 267.—*Asparagus Plants, set a foot deep, 6 feet apart in the Rows.*

rows are 6 feet apart, and the plants are set 3 feet in the row, (fig. 268.) The ground is cultivated and kept clean through the summer. In autumn,

after growth has ceased, and the stalks have been cleared away, two furrows thrown apart are plowed with two horses right over the crowns of the plants. The wide furrow thus formed is filled to a depth of 5 or 6 inches with

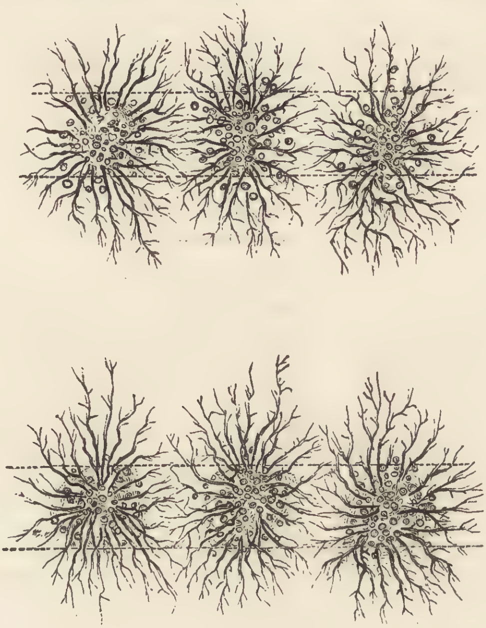


Fig. 268.—*Asparagus Plants, (plan,) Rows 6 feet apart; Plants 3 feet in Row.*

old, well-rotted manure, (fig. 269,) and the soil is then plowed back, covering it, (fig. 270, next page.) In alternate years superphosphate is applied at the rate of half a bushel to fifty running feet in a row, instead of manure—

Fig. 269.—*Double Furrows, Plowed in Autumn, over Asparagus Rows and Filled with Manure.*

both together would answer well. With this treatment each year, the plants will have attained a full growth in five years, and each plant becomes a stool of shoots fully two feet in diameter. One of these stools

has thrown up no less than two hundred shoots, some of them an inch and a half in diameter. An essential part of the treatment for the preservation of the vigor of the plants, is to cut the shoots for the table only from alternate rows in each year. This prevents exhaustion.

Fig. 269.—*Manure over Crowns after Covering with Plow.*

In running the deep furrows over the crowns of the plants, as already described, if the crowns or the roots happen to be torn, no harm results, but rather benefit, the plants being at that time in a dormant condition. During the growing season, care is taken not to injure them, and the rows are cultivated with a horse, and kept clean like a common cornfield.

The gentleman whose practice we have described, remarks: "The objects in manuring in this manner, instead of broadcast, are the following: 1. The finely decomposed manure is a light material for the shoots to force through, which is important in heavy soils where much time is consumed by the plants overcoming their resistance. For the more quickly the shoots reach the surface, the more tender and finely flavored they become. 2. When the manure is applied broadcast at first, a ranker growth of weeds is produced. 3. Broadcast manuring being usually done in autumn, and left on the surface, it makes a harbor for moles and mice, which do serious damage by eating the crowns. 4. The plants feel the manure more quickly. Superphosphate and guano, in as close contact with the crowns as this treatment places them, do not injure the plants. The body of the soil where the lateral roots run is fertilized by the old manure thrown out by the plow the following season."

This plan is recommended to produce asparagus of the finest quality for the home table; and if it is marketed, will command a price, from those who appreciate it, repaying the expense.

"Many families who spare no expense in having their tables supplied with every luxury, who grow their early cauliflowers and lettuce under glass, and who are exceedingly fond of asparagus, never have this prince of vegetables of even medium quality."

SUPERPHOSPHATE ON ASPARAGUS.—Peter Henderson says he has found superphosphate of lime very useful as an application to asparagus beds, at the rate of 500 pounds per acre (which would be a little over three pounds to the square rod), sown on the beds and hoed in. When tried on alternate rows, the difference was nearly a foot in the height of the stalk in favor of the phosphated rows; and the crop was nearly double when cut the following spring. This experiment is easily performed by those who have superphosphate on hand, but the same degree of success is not to be

expected on all soils. We have known other crops to be equally benefited by the application of this fertilizer in one place, while the effect was imperceptible in another neighborhood not six miles distant, with no visible difference in the character of the soil.

EXTENSIVE CULTURE OF EARLY TOMATOES.—J. Peirson of Genesee county, N. Y., who raises annually many acres of tomatoes for canning, finds the two best to be Conqueror and Hathaway, the former proving as early or earlier than the Hubbard—larger, smoother, and a better grower. They were beginning to ripen in the open ground about the middle of July. The course pursued in raising tomatoes is to plant them in a hot-bed in February, or rather in a simple propagating house, the beds made of manure, like a hot-bed, for bottom heat and artificial heat used to keep the air warm above them. In a month the plants are taken up and transferred to small tin boxes, made by cutting refuse cans in two (covering the hole with a small chip), which in this way cost nothing (fig. 271.) In May they have become strong plants, and are set in open ground, with all the earth and roots adhering together, and continue to grow without any check. The best crops of tomatoes yield 400 bushels per acre; none go below 200 bushels.

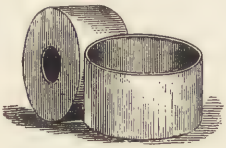


Fig. 271.

MUSKMELONS FOR MARKET.—The muskmelon is successfully cultivated for market by E. P. Bowen and H. C. Howard, enterprising young fruit raisers of La Salle, N. Y. Their practice is to start the young plants in a cheap greenhouse, by planting in boxes 3 feet long, with ten divisions in each, these divisions being 3 inches square in the clear, and $2\frac{1}{2}$ inches deep—fig. 272. If larger, they would succeed rather better, but the boxes would in that case occupy more room in the greenhouse. When the plants have made three or four leaves they are set out in open ground, by prying off one side, fig. 273, and sliding out each plant with its mass of fibres and roots, and setting it where it is to remain. These plants remain stationary for about a month after setting, when they again begin to grow, and soon make rapid progress. When we saw the plantations, in July, they

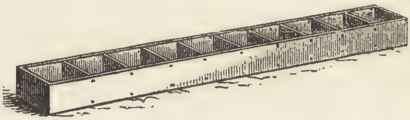


Fig. 272.

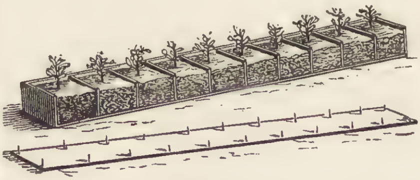


Fig. 273.

had covered the surface of the ground with runners and leaves. A large variety of the green nutmeg is planted for this purpose. The sales amount to from $200 to $400 per acre.

EARLY POTATOES.—Potatoes may be planted as soon as the frost is out of the ground, and will not be injured if white frost does come after they are up. We make a gain of at least one week in early garden potatoes, by starting them in the end of a hot-bed, setting them out in rows in open ground after they are furnished with green leaves. In one case a white frost cut the tops afterwards, but there were enough left for the plants to grow and give a good crop. They might be protected by newspapers when frost is threatened. The cut pieces were placed in contact in the hot-bed, and buried an inch or two in depth.

POTATOES PLANTED DEEP.—We tried the experiment one year, on several alternate rows of potatoes about thirty rods long, of planting a part about two or three inches deep, and another part five inches deep. The latter invariably produced about 20 to 25 per cent. more potatoes, the treatment in every other respect being the same. They were cultivated flat, which always gives more than when ridged.

PROFITS OF VILLAGE GARDENING.—A correspondent of the American Agriculturist gives a statement of his experience in a garden of one-twelfth of an acre. He is a dry-goods dealer, and does the work with his own hands, out of business hours. He began solely to raise vegetables for family use; but by thorough cultivation and very early crops, he sold $73 worth besides. He used an abundance for his family, and gave away largely to his neighbors. Doubtless the health which his exercise has afforded has been worth more than the sum for which all his crops would have sold. He does not give the causes of his success, but we have no doubt it was by using plenty of manure, worked and re-worked into the soil, entire freedom from weeds, and a selection of such crops as afford the best profits.

BEST GARDEN VEGETABLES.—A. S. Fuller gives, in the Rural New-Yorker, the results of his experience with garden vegetables. For tomatoes he found the Conqueror and Canada Victor good, very early sorts; for a general crop nothing is equal to the Trophy. For cabbages, Early Wyman and Early Wakefield are good; he would plant the Winningstadt for market, although poor in quality, it always gives solid heads. For winter sorts he prefers Fottler's Improved, Brunswick and Curled Savoy. Among beets, none excel the old well-known Bassano for early, and the Long Blood for a late sort. With peas, after trying many sorts, he comes back to the old Champion of England. For early market, Dan O'Rourke, Carter's First Crop, "and similar tasteless sorts," he thinks will do well enough for city people.

THE BEST ONIONS.—From a report furnished us by Prof. Beal of the Michigan Agricultural College, it appears that experiments have been made on the grounds of the college with a large number of new and old varieties of onions. From these experiments, Prof. B. recommends as most

valuable, the Red Wethersfield and Early Red Globe, for red onions; although not quite so good in quality as the yellow and white varieties, they yield and keep well, and are rather more hardy. For yellow onions, the Yellow Danvers and Improved Large Yellow are best. The white sorts are most delicate, and need careful handling; the best are White Globe and White Portugal. The Giant Rocca, Southport, Late Globe, and Giant Madeira, were large and productive, but did not ripen.

LARGE SEED BEST.—Experiments have been made at Halle and Leipsic, showing the superiority of large-sized seeds for garden vegetables. Beans and peas were tried with large and small seeds side by side. The plants from the large seeds were earlier and grew more rapidly, and there was about one-tenth in the difference of the crops in favor of the larger seed. The large seeds also germinated with much greater certainty. In the experiments, an equal number of living plants were taken.

SOAKING SEEDS.—W. R. Lazenby, of the horticultural department of Cornell University, has made a number of experiments, and finds that by sprouting garden seeds before sowing, there is a gain of three or four days in the time of ripening.

NOTES IN FRUIT CULTURE.

HOW TO RESTORE NEGLECTED ORCHARDS.

A CORRESPONDENT of the COUNTRY GENTLEMAN has made inquiry for the management of a neglected and browsed young orchard, of which he had lately become the owner; many of the trees with the

Fig. 274.

Fig. 275.

distorted tops and suckering bases shown in fig. 274 and 275, and some worse, or with three or four stems from the bottom. As this orchard had been entirely neglected, the first great point was to impart vigor to

the trees by good cultivation and manuring on the whole surface of the ground. Hoed but not sown crops may be raised between the rows. Next, the trees should be properly pruned, early in spring, and never while in leaf. In fig. 274, all the suckers, *A B C*, may be closely cut away, and the long outside branches shortened in so as to make a neat, handsome head. In fig. 275, more care will be required. In addition to the removal of the suckers, the top branches may be cut off at *A* and *B*, leaving *C* for the top; and if there are good buds at *A*, they will be likely to throw out new shoots, and give a better shape to the head. Or cut off the right shoot just above *A*, retaining the small brush. Where the original stem is crooked or unthrifty, cut it entirely away, if a straight, vigorous sucker can be found to take its place.

By such treatment, you will in a few years have such fine trees as in fig. 276; if, on the contrary, the orchard is left in continued neglect, it will give old trees like fig. 277.

There are two precautions to be observed in pruning and in cultivating the ground, so long as you wish to preserve or increase the vigor of the trees,

Fig. 276.

Fig. 277.

namely, never to prune while the buds are swelling or opening into leaf, nor while growth continues; and never to plow among the trees during the same period, when breaking the roots would tend to check growth. Surface cultivation should only be adopted at such times. When the trees are dormant, pruning tops and roots will do no harm.

Keeping Apples for Daily Use.

The question is often asked, what the best way is to keep apples for common family use. We have found central shelves in an apartment set off or devoted to this purpose, the most convenient. The apples are spread on these shelves, only a few inches deep, so that they may be readily examined or picked over, as fast as decay commences on any specimens.

It is very important that the apples be kept as cool as practicable after gathering in autumn and before the freezing weather of winter arrives.

For this purpose they are placed on the floor of an out-house facing the north, and allowed to remain there till about the time that freezing weather commences, when they are removed to the shelves of the fruit-room in the basement of the house. This fruit-room (which is about 10 feet wide and 30 feet long) is separated from the rest of the basement by an 8-inch brick wall, and has a cement bottom to keep the air dry enough. Windows for ventilation are hung on hinges, so that they may be opened or closed to any desired degree, for the regulation of the temperature by the thermometer. The nearer this temperature is to freezing, the better the fruit will keep. When the weather is warm outside, the windows are closed to exclude the warm air; when colder, they are opened sufficiently to admit cool air and keep down the temperature.

The apples being thinly spread on the shelves, any decaying specimens are readily detected and removed, care being taken *not to disturb or tumble over the sound apples which remain.* An examination every few weeks during winter and spring will keep the supply clear of rotten apples.

Among the advantages of this mode is the readiness with which the specimens which will not keep are separated from the others, and only long keepers allowed to remain. When fruit is kept headed up in barrels, which is a common mode, this selection and separation cannot be made; and while they keep better thus excluded from the air so long as all remain sound, the commencement of decay in a few specimens soon spoils all the rest.

A little practice will enable the attendant to remove those specimens which will not keep, even before decay begins; and by going over the shelves several times during winter and spring, none but sound, long keepers are left.

As warm weather approaches, and it becomes more difficult to keep the apartment so cold as may be desirable for the fruit, a portion of the soundest and hardest are selected and placed in shallow boxes and shoved under the lower shelf, on the bottom of the cellar. The cold cellar bottom keeps them at a low temperature, and the shelf above serves as a cover to prevent air currents. In this way we have fresh specimens of such fruits as the Baldwin and Rhode Island Greening at the middle of June, and we sometimes keep fine, hard, fresh Greenings into the month of July.

The three leading requisites for success are—1. Placing the apples in a cool out-house in autumn till freezing weather. 2. Removal of decaying specimens from the shelves. 3. Keeping the temperature as low as practicable without freezing, by a proper adjustment of the hanging windows.

Gathering and Packing Fruit.—An excellent paper on this subject from E. H. Benton of Le Roy, although furnishing directions well known to our most successful fruit-growers, gives some hints worth repeating in condensed form:

In picking, make two grades, or even three, but never put imperfect fruit

along with good, as it reduces the whole package to the grade of the poorest. It does more—the good makes the poor appear much worse than it really is, by contrast. Medium fruit will sell well, if all the fine specimens are taken out. The *hand* is the best of all machines ever made for picking—hence the importance of step and other ladders to make all parts of the tree accessible. To save labor, put the fruit in barrels *in the orchard*, and head up before it is moved—then placing it in an out-house till cold weather. In this way time is saved, and bruising avoided. Or the barrels, when headed, may be placed on their sides on rails in the orchard till removed to the cellar. Mr. B. says, "It costs no more to ship a barrel of No. 1 apples one hundred miles than a barrel of windfalls, and any fruit-grower would make money if he rejected one-half his crop, if necessary, to get his barrels filled with sound, fair, salable apples, if he got nothing for the rejected half"—although they may be used to feed animals, or make vinegar. He farther adds: "We do not believe the time will ever come when good apples, rightly picked and packed, will go long begging for a market in the hands of a man *known* to fill a barrel just as he heads it, and who marks the outside exactly as the contents prove on opening it."

Apples for Southern Ohio.—The following list of varieties is recommended in the Ohio Horticultural Report:

Early Harvest, Red Astrachan, Golden Sweeting, Benoni, Trenton Early, Primate, Williams' Favorite, Jefferis, Gravenstein, Maiden's Blush, Porter, Rambo, Ben Davis, Smith's Cider, Rome Beauty, Hubbardston Nonsuch, Winesap, Milan, Jonathan, Tallman Sweet, Dominie, English Russet, Peck's Pleasant, Limber Twig, Jersey Black. The finest apples were raised in orchards where hogs had been kept for a number of years.

Quaint Names.—Several varieties of the apple seem to have been rather unfortunate in the names they have had to bear, and show the importance of attending to a good nomenclature at the first. Among these are Long John, Lopside, Hog-pen, Wild Cat, Sheepnose, Ram's-horn, Jolly Beggar, Pucker End, Betty Brooks, and Old Betty; while the following may be of a more pleasing character, namely, Bachelor's Glory, Fair Maid, Polly Bright, Fail-me-never, Better-than-Good, Sweet Doctor, Sack-and-Sugar, Burst Open, and First-and-Last. All these names will be found in our fruit books.

Horticulture in Schools.—Every teacher of a district or common school should know enough of budding and grafting to teach the scholars by practical lessons. The leading principles of vegetable physiology, as taught in Gray's First Lessons, may be understood by any intelligent teacher in the course of a few days, in connection with a little voluntary field practice. Young students may understand a great deal about germination by planting beans, peas, corn, wheat, &c., and examining the progress of the young shoots every day. They can try the effect of planting at different depths at the same time. They can trace the length of roots from young trees. A few ligatures about the limbs of trees will show them

much in relation to circulation, in the course of the summer. Every teacher should show his pupils how to bud and graft, and to raise plants from cuttings and layers. He should explain the principles to them on which success depends. He will find much to assist him in vol. VII, page 236, of RURAL AFFAIRS. He will find enough for his purpose in relation to germination and other processes in vegetable physiology, on page 144 of vol. III, of the same work. These things should be well understood by both girls and boys; they will not only prove attractive and interesting, but be useful all their days. Young men spend years in the study of Latin and algebra, which are useful; but one-tenth of this time given to the fascinating and useful arts connected with vegetable growth, would be more valuable for the time devoted. Young ladies study French and crayon work for years, but if they could cut off a few fragments of this time, and give them to some of the arts connected with horticulture, it would be better for their health, their minds, and add much to their usefulness.

FRUIT AS MEDICINE.—Many years ago a chronic cough induced us to look into medical books for the best expectorants. Dr. Good stated that ripe raspberries were one of the best remedies of the kind. As it was then approaching mid-summer, we obtained a daily supply for some weeks. We found them quite an agreeable medicine to take. They cured the cough. Again, at a late meeting of the Western New-York Farmers' Club, Wm. H. Pillow of Rochester said he had been in the small fruit business several years, and he believed that strawberries had saved his life. One spring, after severe sickness, he had no appetite till strawberries came, when he almost lived on them, and improved rapidly. Land-owners, plant strawberries and raspberries!

CANKER-WORM PROTECTOR.—The following contrivance, described in the COUNTRY GENTLEMAN, by J. H. Blaney, is an improvement on a similar one described in RURAL AFFAIRS, vol. VI, page 231, (where *tan* was misprinted "tar,") and can be made for about half the price:

Having succeeded the past six years in controlling this orchard pest, I write that others may do likewise. My plan is to have a wooden box, with a gutter containing oil, tar, or printers' ink; something that will be soft and sticky, in which to entrap the grub in its ascent up the tree, as the grub (the female worm) commences its ascent in this locality the latter part of September, and continues until the ground freezes, and again as soon as the frost is out of the ground in the spring, for a term of some sixty days. Care must be taken that the trough or gutter is kept supplied with oil or tar, and kept soft and sticky. If the right material is used, an examination once in two to four weeks is sufficient. The space around the trees inside of the boxes is to be filled with tan bark or sand for a depth of 8 to 10 inches.

The Tree Protector is constructed as follows: A box 20 inches square inside, 12 inches deep, and of boards one inch thick, tongued and grooved at the corners, and nailed together, with top and bottom open,

fig. 278. The oil gutter is a piece 2 by 2½ inches, with a groove one inch by three-quarters of an inch deep, mitred and put together, with paint in the corners and nailed three-quarters of an inch below the top of the box.

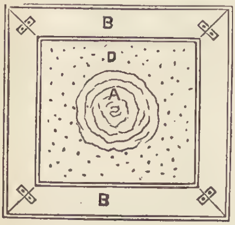


Fig. 278 —*Canker-Worm Protector.*

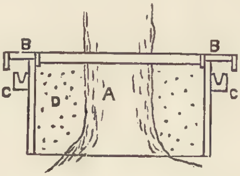


Fig. 279.—*Vertial Section—A, Tree—B B, Cover—C C, Trough—D, Space filled with tan, sand or lime.*

The cover is made four inches wide, and one inch thick, mitred and grooved, with tongue in the corners, the size to be one-quarter inch smaller inside than the box. A band ⅝ by 1½ inches is put on the inside, to keep the cover in position. Also a band ⅝ by 1½ inches, to be put around the outside to keep the storm from the oil groove. A small piece, ⅝ by 1½ by 4 inches long, is nailed across the joints to stiffen the cover. The cost of the above protectors was $1 each, and they can be made by any carpenter, or at any mill. Some of its advantages are, it allows the growth of the trees for years, without bursting the protector, as is the case with some made from tin. Again, from the first of June until September the box can be raised, the sand, tan or other filling distributed, and the tree washed if desired, and the saving of one crop will pay for protector and labor.

CURCULIO.—The common practice, which, if unremittingly and faithfully followed, will protect the plum crop from the curculio, is to jar down the insects on sheets and kill them. Ellwanger & Barry of Rochester, N. Y., adopt this mode, with the additional care, not commonly observed, of sweeping up daily and destroying all the fallen and infested fruit, the surface of the ground around and under the trees having been made smooth and beaten hard for this purpose. In this way they effect the double object of killing the insects which are at work on the young fruit, and destroying the young larvæ which would sting it the next year; and their trees are always heavily loaded.

CURRANT WORM.—The Agriculturist gives the following as having proved successful, to be used when hellebore cannot be had: Mix five pounds of whale-oil soap with one quart of kerosene, stirring them well together, adding five gallons of boiling water, and stirring again to incorporate them. Then add twenty-five gallons of water, and squirt on the bushes with a syringe, early on a clear day, that the liquid may dry on the leaves. Many persons would not need so large a quantity, in which case the above quantities may be reduced to one-half or one-fourth.

KEROSENE FOR INSECTS.—The Gardener's Monthly recommends the

use of kerosene for syringing mealy bugs, by mixing a small portion of the oil with suds of medium strength. It will readily combine with suds. The quantity of kerosene is not stated, and those who use it will have to try it in various proportions, and observe the results on the plants.

To Exclude Mice from Trees.—1. If before freezing up, embank compactly and smoothly around the stem ten inches high. 2. If the ground is already frozen, make similar mounds of coal ashes, beaten compactly. 3. When both these are omitted, tread compactly the snow about the young trees when it falls. 4. An effectual remedy is to apply a roll of tarred pasteboard or sheathing paper, or a sheet of tin. Sometimes paper has been wrapped around the tree, and gas-tar then applied outside, but this should not be practiced, as the gas-tar soon penetrates the paper and injures the bark of the tree.

Protection from Rabbits.—J. T. Hawes bought sixty shoe boxes, knocked them to pieces, saved the nails, split the boards three inches wide, and made them into square boxes or tubes, nailing three corners, and leaving the fourth to spring around the tree. The shoe boxes cost fifteen cents by the quantity, and each made five tree boxes, and they formed a perfect protection against rabbits, mice, sleety storms and hot sun.

Sheep and Swine in Orchards.—The Report of the Maine Pomological Society states that Washington Gilbert of Bath had found it profitable to feed corn and small grains to sheep and swine in the orchard, both for destroying the codling moth and keeping up the fertility. He thinks the market product of the animals would pay all the expenses; and in this way the culture of the apple be carried on to great profit and on a large scale. Thus managed, he thinks an orchard could be relied on for $100 per acre annually. He had seen apples more than doubled in size by pasturing swine, in a single year. Alfred Smith of Monmouth had seven acres of orchard, which was full of quack grass (or twitch grass), but the sheep and swine pastured in the orchard had entirely destroyed this grass, the sheep eating it very close. He regarded cultivation and manuring as of great importance to orchards in poor soil. He had another orchard where the soil would not yield a quarter of a ton of hay per acre. The trees were feeble, and there were many dead limbs. These were pruned out, the ground plowed and heavily dressed with manure. The trees put on new vigor, and bore abundantly of fine fruit.

Buying Fruit Trees.—We see a recommendation lately published either to send directly to a nursery for the trees, or else through a regular agent, "and to hold him responsible for correctness." How is the purchaser to know whether the trees are correct to name? He may wait several years before they bear; and even then it may require a pomologist to determine difficult questions. Besides how is the judge to know that the fruit came from the trees bought? They may have lost their labels in the course of years, or died out and been replaced by others. A much better way, and to avoid all this difficulty, is to buy of a nurseryman who

has established his reputation, or of his well-accredited agent. The best nurseries keep their agents in one field, where purchasers know them. Intelligent readers of journals and books devoted to these subjects, with corresponding practice, know where to apply and what to do. Others are constantly liable to be imposed on.

WATERING TREES.—As a general rule, watering young trees in summer does more harm than good, by crusting the surface, without reaching the roots; and even if the roots are reached, the relief is only temporary, unless the watering is regularly repeated. There is a great want of appreciation of the amount of water required for trees by those why apply this remedy. A young tree four or five feet high, if growing well, soon throws out roots several feet on each side. If these roots are only three feet long, the circle of roots will be six feet in diameter, and at a depth of one foot there would be no less than twenty-seven cubic feet of earth to saturate with water, requiring for one-fourth the bulk nearly one hogshead for a single watering. It is true that a young tree just set out may have had its roots cut much shorter, but as new ones are to be quickly thrown out into the soil as it commences growth, a narrow watering will do but little good. Clean mellow culture is better than all the watering that can be given—or wide and heavy mulching if cultivation is impracticable.

PRUNING.—There are four grades of pruning—first, the nip of the thumb nail, and if always done in time, no other would be needed. Secondly, with the pocket knife, which must be used on shoots of one year's growth, while yet small, when they prove supernumerary. Thirdly, the removal of small limbs an inch in diameter, the wounds soon healing over and requiring no special protection. And fourthly, last, and not to be resorted to except when trees have been badly neglected, sawing off large limbs, the wounds of which need the protection of paint, grafting wax, or other covering. The first is to be preferred, and can well be used when the owner or gardener can frequently examine young trees; but in its omission, the second is nearly as well; the third will answer; and the fourth is a reluctant necessity.

ACCIDENTAL PRUNING.—An old New-Englander once remarked to us when we advised him to pinch back his blackberry bushes, to keep them within bounds, and make them bear better, "That's so! I can remember when I lived down at Dartmouth, that we always found the most blackberries on bushes that the old cow had browsed down." We lately saw another example in a western paper, where a farmer had set out a hundred apple trees in autumn, and was advised to cut the shoots back, to counterbalance the necessary cutting of the roots in taking them up. But he declined. In the winter a cow broke in and cropped the tops of twenty-five or thirty, and the winter being severe, these and a few others, were the only trees which survived. The others had more top than they could carry, and whipping about in the wind, they did not grow. We would not, however, recommend the cow-pruning for general adoption.

A List of Pears.—F. R. Elliott gives the following list for an orchard of a hundred trees. It is a good list, although every planter would vary more or less from it, and even Mr. Elliott himself, with his wide experience, would doubtless make a different list next time, without this list before him. Variations, however, are not always improvements. The following is the list, which we condense from an article written by him: One Beurre Giffard, 1 Rostiezer, 1 Dearborn's Seedling, 3 Clapp's Favorite, 5 Ananas d'Ete, 10 Bartlett, 20 Beurre d'Anjou, 3 Beurre Bosc, 2 Superfin, 2 Clairgeau, 2 Doyenne du Comice, 12 Duchesse d'Angouleme, 5 Flemish Beauty, 2 Howell, 5 Onondaga, 2 Henkel, 5 Louise Bonne de Jersey, 1 Seckel, 1 White Doyenne, 6 Emile d'Heyst, 3 Winter Nelis, 1 Josephine de Malines, 1 Doctor Reeder, 6 Vicar of Winkfield. Some persons who only wish to have as few kinds as possible for a succession, would select only Rostiezer, Bartlett, Louise Bonne of Jersey, Duchesse d'Angouleme, Beurre Bosc, Beurre d'Anjou, Josephine de Malines.

Cherries for the West.—An Iowa planter wishes to know the best cherries for planting at the West. We would confine the selection to Dukes and Morellos for all that region, and name the Early Richmond, Mayduke, Large Morello, Donna Maria, Belle Magnifique, Pie Cherry or Late Kentish, and Belle de Sceaux. The Heart and Bigarreau cherries mostly fail at the West. The Belle Magnifique does best on Morello stocks.

Early Strawberries.—Purdy's Fruit Recorder describes the mode by which strawberries may be had one or two weeks earlier than in common open ground, which we condense and give briefly as follows: Select ground sloping to the south about one foot in ten. Set early varieties late in summer in the bed about half a foot apart each way. Set up planks edgewise, securing them by stakes, nearly two feet high on the north and west (protection from winds), and half a foot on the south and east. Bank against these with earth. On the approach of winter, cover the plants with evergreen brush, or common brush covered with coarse straw. The winter protection, aspect, and shelter of the plank, hasten the ripening several days.

Wintering Strawberries.—Even when they are quite hardy, some protection during the severity of winter will bring the plants out fresh green and vigorous early in spring, and they will ripen the fruit sooner and bear more abundantly. If the soil is not decidedly rich, a coating of manure between the plants will be an excellent protection; and if much exposed, add a thin covering of rye or other stiff straw, a thin layer of cornstalks, or still better, evergreen boughs or branches. Leave a small portion exposed, and you will be satisfied by the contrast in early spring after the removal of the covering—the one fresh and green, the other brown and feeble.

Succession of Strawberries.—The Boston Cultivator says that city is annually supplied with fine, fresh strawberries for a long time, first from the

South, and finally, in great abundance and excellence from Nova Scotia. We are not informed how long this season of strawberries lasts at Boston; but if the supplies begin to come from Norfolk, and continue in succession from Delaware, New-Jersey, New-England and Nova Scotia, and allowing one day for each twelve miles of latitude, the distance of the two places, 550 miles, would give a difference in ripening of forty-six days, or a month and a half. The difference in the times of the ripening of different varieties, from early to late, or between such early sorts as Nicanor, Jenny Lind and Downer, and the late Jucunda and Kentucky, would give nearly another month to be added to the season. Taking into the account the moderate supplies from places farther south than Norfolk, we might say safely that the strawberry season is made to extend over a season of two and a half months.

TRANSPLANTING RASPBERRIES.—The Rural Home recommends taking up and setting out young raspberry plants when the new shoots have grown two or three inches, when they are to be had at hand, and not from a distant nursery. The process is in substance as follows: Put the ground in good mellow condition; stake rows six feet apart; take up the plants with a light spade, and with adhering soil, placing them in a market basket; set them out, using the hands to draw the earth to the roots, pressing it down firmly. A distance of eighteen inches in the row is recommended. These late planted raspberries are found to make a better growth than those set early in spring. This mode applies more particularly to tip-rooting raspberries, but it may be used for the red kinds—in either case handling with care to prevent injury to the young shoots.

RASPBERRIES AND BLACKBERRIES FROM CUTTINGS.—A. S. Fuller describes his process for raising young plants of raspberries and blackberries from cuttings, a better way than raising raspberries either from rooting tips or from suckers. We give the substance of his directions in condensed form: Dig up the plants to be propagated late in autumn, with all the roots that can be secured. Cut the roots into pieces about two inches long, and place them in alternating layers with sand or fine moss in a box. Place the box in a cool cellar to prevent growth. Keep the sand or moss moderately damp. Early in spring the cuttings will have well developed buds. Plant them out in drills, in rich ground, two inches deep. If well cultivated, they will make good plants by autumn. The caps and purple canes do not propagate so well this way as others, and require some artificial heat.

THE CURRANT.—Dr. Long said at the horticultural meeting at Alton, Ill., that those who eat freely of currants will never need the doctor. He has picked forty bushels of fruit from a fourth of an acre. They want good culture, although often grown in fence corners without care. The ground around the bushes should be kept mellow and free from weeds or grass, and should have every year a dressing of ashes and rotten manure, and whenever attacked by worms, should be dusted with powdered white hellebore.

HONEY LOCUST HEDGES.

DURING A RECENT DRIVE of more than forty miles through one of the best counties of the State, we saw many miles of honey-locust hedge, without a single good, well-formed specimen. It seems almost impossible to impress on farmers the necessity of taking as much care of trees and hedges, as of their corn crops. The former are almost universally neglected; the latter receive all the attention and labor requisite for the best success. The honey locust has the recommendation of great hardiness and large and terrific thorns. But its naturally tall and sparse growth renders necessary a greater amount of attention to give the line of trees a dense and compact form. We sometimes see hedges of this tree worked into the desired shape. But in all the forty miles above mentioned, no example was seen of this character. We trust it may be useful to point out the failures, and show what should be accomplished to make a perfect hedge of the honey locust.

Fig. 280.

Some of the hedges just mentioned, which had been planted several years, had obviously never received a moment's attention since the day they were set out. And the setting had evidently been carelessly done, as there were large gaps all along the line. Some of the trees were twelve or fifteen feet high, and others only two or three feet. The appearance was like that shown in fig. 280. Others had been well set, but with no subsequent care. These were more uniform, had no gaps, but the trees had not been cut back to thicken the growth, were several feet high, with a rank growth above, and open below, as in fig. 281. A very few had been cut back, and were more dense; but the owners had allowed the space of a foot or more between the cuttings, and they did not present that thick and solid appearance essential to a good hedge. These are shown in cross section in fig. 282. All these are defective and insufficient, and

Fig. 281.

Fig. 282.

cattle and other animals, with some inducement, might break through the best of them.

To make a good hedge of the honey locust, it is essential, in the first place to procure plants with good roots, and if these vary in size, they should be assorted, placing those of equal size together, so that the line may be even, and not with large and small plants mixed together. Secondly, the ground must be well prepared, giving a deep and mellow soil. With care in setting out, there need not be any gaps, and the trees will be uniform in size. Thirdly, the soil, for some feet on each side, must for some years be kept clean and well cultivated, and not allowed to grow up with weeds and grass. The hedge should be as well treated as a row of potatoes and corn, which no farmer would expect to yield a crop in a grass sod. Fourthly, the young trees must be cut back sufficiently to give a broad, dense mass of horizontal shoots at the bottom. This cutting should be done early in spring, and at no other time. If deferred till the buds have swollen, or the leaves have opened, a severe if not fatal check will be given to the hedge.

It is usually best to allow the hedge plants to grow a year or two, to become well established before cutting back; then to cut down in the first place to within three inches of the ground ; this will cause numerous shoots below the cut, as in fig. 283. The second year the cut should not be more than 3 or 4 inches higher ; the third about 6 inches, and so on increasing the height each successive year until the hedge has reached the desired height. It will require several years to make a good hedge, as in cross section, fig. 284. Many prefer to make longer cuts, or about a foot each year, so as to have a hedge in half the time we have indicated, and in doing so they never get one deserving the name, but merely the skeleton or shadow shown in fig. 282.

Fig. 283.

Fig. 284.

Fig 285.

The importance of cutting back in spring before the buds swell, will be well understood by any one who will leave a small portion of his hedge until the leaves have opened. The result will be that the growth, instead of being strong and vigorous, as shown in fig. 284, will be feeble and thin, with only a few small shoots, as in fig. 285.

FLOWERING PLANTS AND GARDENING.

THE DOUBLE ZINNIA.—This is the easiest to procure of all showy lawn flowers. A few seeds sown in the open ground in a circular bed have furnished a profusion of flowers from June to the end of September, and if no severe frost comes, they will undoubtedly continue some weeks longer. The plants grow with vigor, without any care, are about

Fig. 286.—*Double-Flowered Zinnia.*

three feet high, and are covered with a profusion of scarlet, crimson, yellow, orange, purple, maroon and variegated double flowers, making a fine show when seen at a distance. If the plants which bear single flowers are pulled up as soon as they show their character, the double ones have more room, and soon fill the whole space. Those who cannot afford to procure geraniums, verbenas, and other bedding plants, may have the zinnia with almost no care. We sometimes see beds of the zinnia spoiled by growing too thick.

CHEAP PROPAGATING BOX.—A correspondent of the COUNTRY GENTLEMAN describes a small and cheap box for starting cuttings of various kinds, which is so constructed as to preserve a constant supply of moisture, so essential to starting the roots of cuttings. In the annexed figure, (fig. 287, next page,) which is a vertical section of the whole contrivance, *B* is the outside box containing the whole, made of ¾-inch boards, and is about 10 inches deep, 12 inches wide, and 20 inches long. It may be made larger if desired. A strip of wood an inch square, *C C*, is nailed around the inside half way down. This strip supports a tray, *D D*, having a wire-gauze bottom, for the free passage of moisture. If this wire-gauze is of copper, it will last longer than iron. The tray contains the plants or cuttings. The top is covered with a single pane of glass, *A*, 12 by 20 inches, or more

cheaply, with two panes, each 10 by 12 inches. The water pan *F* furnishes a constant supply of moisture to the plants above, better than could be done by watering. A cast-off box of nearly the right size may be bought

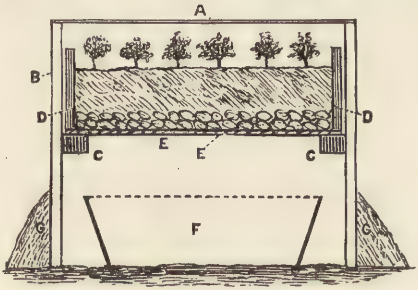


Fig. 286.—*Propagating Box.*

at a shop or grocery. The whole will cost but little. The box is placed upon the ground, and banked outside with earth, *G G*, if the weather is warm, or with manure, if colder.

PLANTING A WILD GARDEN.—We have seen a beautiful grove growing among the rocks of a wild gorge, rendered exceedingly attractive by interspersing the native shrubbery with planted rhododendrons, which were in full bloom when we saw them. Additional charms might be added by investing the rocks and bushes with the trailing forms of the hardy clematis, of the periploca, the climbing honeysuckles, &c., while the wood lilies, gentians, and other plants which bloom freely in the shade, would give additional attractions. Early in the season masses of the hepatica, sanguinaria, erythronium, and other spring-blooming wild plants, would make such a wild garden exceedingly attractive. Cultivated exotics, such as our common bulbs, snow-drops, squills, hyacinths, &c., might be introduced in open spaces along the borders of the more dense portions of the wild shrubbery. If these were properly introduced, they would lose all the artificial appearance too often given them, and become an essential component part of the wild scenery, and their ornamental effect be thus greatly increased.

For such a garden to give the best effect, it is almost essential that the surface be more or less uneven, and a small ravine, with some rock, would be a valuable addition. A stream of water lined with ferns and water plants would add still farther to its charms. A narrow, curved gravel walk, kept smooth and in perfect finish, would not be discordant with the general effect; it would be the only artificial part of the grounds that could be admitted.

FLOWERS AND MACHINERY.—The London Garden contains a fine engraving of a greenhouse attached to the engine-room at the manufactory of the Waltham Watch Company, near Boston, Mass. The chief engineer, being very fond of flowers, has erected a greenhouse against the engine-

room, and has tastefully filled it partly with flowers in pots, and partly with climbers in larger beds of earth, and these climbers hang in festoons between the engine and the greenhouse. Clusters of grapes ornament the glass roof. The contrast between the ponderous revolving machinery and the delicate tints of the flowers and foliage, is both pleasing and striking. We take it for granted that the necessary heat for the plants comes from the boiler and engine. The surroundings of the building are handsomely planted, and the workmen, instead of being confined to the usual dingy apartments, are constantly in the presence of pleasing objects, which we think on the long run, by acting on the spirits, must increase health and longevity.

FLOWERS AT RAILWAY STATIONS.—For some years we have seen a fine display of annual flowers at one of the way stations on the Auburn branch of the New-York Central, which have always afforded a subject of pleasing remark to the passengers, and they must have been a constant delight to the occupants of the station house. Another case is mentioned by the London Garden. The walks on both sides of the platform at Lower Norwood Station are fringed with rock borders, and carpeted with saxifrages, sedums, and other low growers, with persistent green leaves, and some bedding plants are added to give brilliancy of color. On one side is a handsome carpet-bed of coleus placed in a flat mass of golden pyrethrum, the whole neatly edged with blue lobelia.

ORNAMENTAL SHEETS OF WATER.—In riding through the country, we see many mill ponds and other small sheets of water, which would be exceedingly ornamental and pleasing with a little tree planting on their banks. As they now are, they have only earth margins ; if planted with lines and groups of trees, they would present a fine landscape effect. Among other sheets of water of the character alluded to is one on the margin of a handsome village, which never dries in summer or freezes in winter, being fed by a large spring ; it comprises four or five acres, and would be one of the finest ornaments in that region, if its dull, bare, clay banks had been well planted with elms, weeping willows, black walnuts, maples, &c., all of which would not have cost $10. The same want of taste which results in bleak public streets, prevents the planting of the margins of beautiful streams, cascades and mill ponds, and the owners and visitors not only lose the enjoyment of a wholesome pleasure, but their property is rated much less when offered for sale.

MANAGEMENT OF HOUSE PLANTS.—J. A. Varney of South Vassalboro, Maine, gives a good practical article in the Transactions of the Maine Pomological Society, on the management of window plants, some of the leading points of which are the following :

There are three great obstacles, the green fly, red spider, and uneven temperature. To expel the first, place a handful of tobacco stems on a vessel of burning coals, over night, with the room closed—repeated occasionally, it will be the end of them. Or, simpler, cover with a sheet, and

smoke the tobacco under it. The red spider comes when there is too much heat and too little water. Place the pot on its side, and syringe with cold water, washing the underside of the leaves. As for temperature, let it range from 45° to 65°; 40° by night and 50° by day would be better. How different from this is the temperature which the plants generally get! If the plants happen to get frosted, cover the earth with stiff paper, and continue to apply cold water from the well by means of the sprinkler as long as any ice can be seen in the pots. Place them in a room only a little above freezing, and raise the temperature very slowly. The best soil is a mixture of equal parts of rotten pasture turf, cow manure and sand. In selecting plants, touch lightly on high-priced new sorts, and choose old, well tried ones.

FAILURE OF WINDOW PLANTS.—E. S. Rand of Boston, Mass., says that of the tens of thousands of pot plants sold from the street stands in spring, probably *not one in ten survives.* They are forced into bloom in small pots, have no constitution, and very few ever give another flower. Plants from the warm greenhouse should be *gradually* inured to the cool rooms where they are to remain. Plants taken from the garden in autumn should be carefully potted early in September, hardened in the shade out doors, and removed to the parlor when the nights become frosty, and have plenty of fresh air on warm and sunny days. If taken up late, they are long in blooming. The following sorts are named as best for windows: Of roses few do well, but among these few are sanguinea, the best; agrippina and safrano; nearly all the abutilons; cuphea, a constant bloomer; cyclamen persicum; oxalis, all the species; Chinese primrose; most of the monthly pinks bloom during all the last half of winter; the zonale pelargoniums; the Indian jasmine and calla lily.

AUTUMN FOLIAGE.—In the village of Union Springs, N. Y., a tree-planting society was formed many years ago, and several hundred trees of sugar and red maple were planted along the different streets. Nearly every autumn these make a gorgeous display of crimson, scarlet, pink and orange, in an almost endless number of shades and different modes of blending. The absence of frost till late in autumn, owing to the proximity of Cayuga Lake, increases the effect. There are two or three trees of surpassing splendor, which maintain this distinction every year. The question arises, will not the time come when these exceptionally beautiful trees will be propagated by nurserymen by grafting, for the purpose of planting on ornamental grounds for display in October? Why would it not be as desirable to give a brilliant termination to the foliage of the season, as to plant for the two or three days of the blooming season in spring?

TULIP BEDS.—These are often planted without order or design. By a proper arrangement of the colors, a greatly improved effect is produced. If you have a sufficient supply of bulbs at the present time, properly assorted, you may divide them under the four principal heads of red, purple, white and yellow. The beds should be circular or elliptical. If circular

they are more easily marked out. Set a small stake in the centre, and then begin to plant the bulbs in successive circles, working outward. There should be about three circles of each color, to make them appear in broad, distinct bands. If there are several shades of color in your supply, keep each single circle distinct, and let the different colors blend or pass into each other, arranging them like the shades of the rainbow. If you have beds from which bedding plants are about to be taken within doors, you may set tulip bulbs in these, and have a brilliant display early next season.

PETROLEUM FOR RUSTIC WORK.—It is not unusual to see handsomely executed rustic work going to decay by exposure to the weather. It loses all its beauty, and becomes positively repulsive, as it begins to give out from the rotting of the joints. To prevent this undesirable result, many procure, at much expense, limbs of red cedar for the material, which, being durable, will continue for many years. There is a much better and cheaper way; and soft wood, easily procured and worked, can be rendered as durable as cedar. Soak the whole in crude petroleum, especially at the joints. It may be easily and rapidly applied after the structure is finished, with a common whitewash brush. The wood will absorb it into the pores as dry sand absorbs water. It is a very cheap oil, and a rustic summer house may be soaked with it at a very small expense. The light petroleum will penetrate the wood most; the heavy will give it a rich brown color. A mixture of the two may be best.

FLOWER POTS IN ROOMS.—Pots which contain ornamental plants in rooms, are often needlessly repulsive by the exposure of the earth in which they are planted. We have found a covering of an inch of white sand to prevent crusting the surface or soiling the edges of the pot, and at the same time allow free watering. A more ornamental appearance is effected by procuring from the woods the handsome flakes of fresh green moss, found in damp places or on rotten logs, and covering the earth in the pots neatly with one of these flakes. It serves as a mulch, keeps the earth moist and mellow, admits watering, and furnishes a neat green carpet under the plants.

EVERGREEN SEEDS.—The following numbers were obtained by R. Douglass of Illinois, an extensive and successful raiser of evergreens, after careful weighing:

Norway spruce, ...	58,000	to the pound.	Austrian pine, ...	28,000	to the pound
Hemlock, ...	100,000	do.	Balsam fir, ...	45,000	do.
White pine, ...	20,000	do.	Cembran or Stone pine, ...	2,700	do.
White spruce, ...	160,000	do.	Am. Arbor Vitæ, ...	320,000	do.
Scotch pine, ...	69,000	do.			

European larch has about 70,000 to the pound, and pear and apple seeds about 12,000.

LICE ON ROSES.—An English writer says that quassia and soft soap will destroy aphides on roses—used by boiling four ounces of quassia chips for half an hour in a gallon of water, and when cold and strained adding two or more gallons of water and six ounces of soft soap. With this syringe

the bushes. The best remedy, however, is tobacco water, made by pouring a gallon of boiling water on four ounces of tobacco, and covering till cold. The shoots may be syringed or dipped in it.

PRESERVING BOUQUETS.—The American Artisan says that bouquets may be kept a month in continuous blooming (of course with a proper selection of continuous bloomers), by first sprinkling with fresh water, and then placing in water containing some soapsuds. Take them out each morning and lay them in fresh water a minute or two, and replace them. Change the soapsuds twice a week.

HARDY SHRUBS.—The following are hardy, of easy culture, and may be obtained from nurseries at moderate prices: Tartarian Honeysuckle, Purple Fringe, Japan Quince, Philadelphus, Siberian Lilac, Snowball, Purple-leaved Barberry, Button Spiræa, Snowberry, Weigela, Double-flowering Almond, Silver Bell, Dwarf Horsechestnut, Deutzia and Boursalt Rose.

ANNUAL FLOWERS FOR WINTER.—Vick, in his Floral Guide, mentions the following cheap and easily raised annuals, for blooming in winter in pots, and which may be easily obtained by any one who may not be able to procure costly or rare greenhouse plants: Mignonnette, balsam, *Cobea scandens*, sweet alyssum, stocks, &c.; and any plants growing in the garden which have not bloomed, may be taken up and potted for winter.

THE SPIRÆAS IN WINTER.—A correspondent of the Prairie Farmer says that the small double white and Reevesii, if grown during summer in open ground, may be taken up in autumn in large pots, and placed in a cold pit covered with glass. Early in March a profuse bloom will appear, very desirable for bouquets and wreaths.

IMPROVED MODE OF SHOEING HORSES.

A MODE of keeping the shoes of horses sharp, attended with little expense, and available at a minute's notice on any slippery emergency, without going to the blacksmith, is described in the London Agricultural Gazette. It was adopted by the Duke of Westminster for all his horses. On one occasion, when, after a mixed fall of snow and rain, the roads became coated with ice, the carriage horses traveled long distances over a hilly country, without the least inconvenience, and without losing a single one of the steel points or studs on the way. It is the invention of G. Fleming, Veterinary Surgeon of the Royal Engineers. The following is the description:

The stud is a simple bit of steel, of any convenient length—about an inch is found to be very serviceable—square, pointed at one end, and slightly tapering from about the middle to the other—that which enters

the shoe. No filing or finish is necessary—*A*, fig. 287. The draught horses have a stud at the toe of each shoe, as well as one at each heel; but we find that, when a little snow is on the ground, a secure foothold is maintained with only one stud in each shoe.

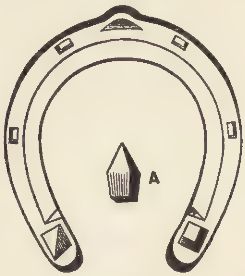


Fig. 287.

Two things have to be attended to in this matter: 1. The stud must fit tightly in the hole, without "wobbling" in any way. 2. It must not pass quite through the shoe, or the hoof will push it out.

To fix the stud in the shoe, it should be driven into the hole by one or two smart smart taps on the point.

The method, in addition to its simplicity and great efficiency, is wonderfully cheap. An old horse-rasp, value threepence, will, when drawn out as a square rod of steel, suffice to make eighty-two studs, which one of my troop farriers can knock off in an hour. A set of these will last for a number of days.

When required to be taken out, a few taps on each side are sufficient for the purpose.

The hole in the shoe, slightly tapering, is made with an ordinary square punch, and the farrier's eye alone gauges the size of the studs, every one of which is made at one heat.

Every shoe put on our troop horses at the end of October and commencement of November had the holes punched in it; and, as a large number of studs were lying in readiness, when the frost set in, the horses were rendered proof against slipping in a few minutes, without going near the forge. This saved a great amount of expense and time, as well as labor, to the farriers, in addition to preventing damaged hoofs and much lameness.

About five per cent. of the studs fell out, but as they are so cheap, this is of no moment; and one stud per shoe affords a good foothold. On long marches a few spare studs were carried. The studs never break in the shoes.

To prevent losing any of the studs, a little practice would be sufficient, in giving the right taper to the studs and sockets, so that they would be firmly held by friction, in the same way that a nail is held in wood.

Frequent Shoeing Best.—Farmers are apt to insist on having their horses' shoes "put on to stay," making this point the only one insisted upon. The rapid growth of the hoof soon renders the best shoe unfitted for the foot. Shoes for farm horses should be so put on that they will stay tight, or nearly so, for five or six weeks, and then be taken off and re-fitted. It causes the expense of "setting" some five or six times more during the year, but saves many a lameness, besides keeping the feet always sound.

SUGGESTIONS IN RURAL ECONOMY.

BOB-SLED FOR LOGGING.—D. B. RAYMOND furnishes the COUNTRY GENTLEMAN with a detailed account of a sled which he has used for years in drawing logs out of the woods, and which will turn short corners, and with which a team will start a load and draw one-fourth more than with any other sled. We have not space to give all the details of construction, but merely to point out the leading peculiarities, which will enable those familiar with coarse timber-bobs to construct one.

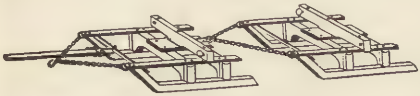


Fig. 288.—*Chain Bob-Sleds.*

The tongue is not set stiff, but is fastened to the nose-piece with two clevises—one on the tongue, and one on the cross-piece, making a sort of universal joint, permitting it to turn at right angles, and allowing the team to turn half around without moving the load, and to clear trees and logs. The draft-chain being entirely independent of the tongue, the latter may be made light. If used much on the road, it should be heavier, and set stiff.

The bobs are coupled together with a forked cable chain in place of a reach, with a grab-hook on each end, and a ring in the centre. This ring is put into a clevis at the rear end of the saddle-plank of the front bob, the other ends of the chain to rings on the nose of the rear bob. The rings are large enough for the chain to double through, so as to let them out or draw them together, and by which logs of any length from 8 to 25 feet may be placed equally on both. The rings, properly put on, cannot catch a tree or brush; and the chains playing up and down, permit the rear bob to go over the roughest ground, logs or brush.

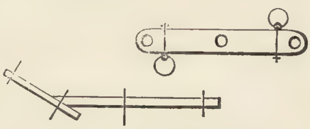


Fig. 289.—*Sled Shoe and Bolster.*

The shoes of the runners are made of the hardest dry wood, sawed slightly across the grain, so as to wear with it. They will last a whole winter. The lower figure in fig. 289 shows how they are put on. The bolster of the rear bob is 4 by 5 inches. The bolt heads which fasten it should be "let in," so as to be out of the way. The bolster of the forward bob is shown in the upper figure of fig. 289, and has rings to bind the load. The saddle-plank, on the front bob, should be $2\frac{1}{2}$ inches thick and a foot wide, to support the king-bolt and whole load.

HAY RACK.—L. D. SNOOK describes the following convenient form in the COUNTRY GENTLEMAN: There are many forms of hay and grain

riggings, but as far as my experience and observation extend, the one shown in the accompanying illustration (fig. 290) possesses more desirable qualities than any other: *T T* are bed-pieces of pine or other straight-grained light wood, 14 or 16 feet in length, 8 inches wide and 3 inches thick; if of oak or other hard wood, 2½ inches thick will give sufficient strength. Four cross-pieces, *B*, of hard wood, 1½ inches thick and 6 inches wide, are morticed and firmly secured to the bed-pieces. This constitutes the frame or foundation, and is shown in fig. 291. It is frequently used separately, to haul rails, boards, stones, manure, &c., and is a convenient, strong and handy arrangement for the purpose. In fig. 280 is shown the rigging complete, of which its four cross-pieces or arms, *P*, are 7½ feet in length, 5 inches wide and 2½ inches thick.

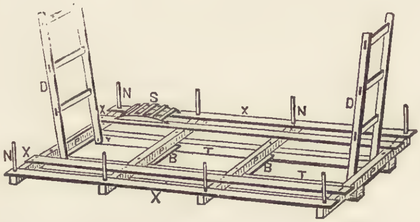


Fig. 290.—*Combination Hay Rack.*

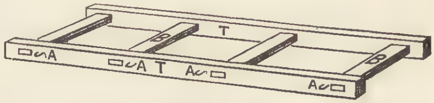


Fig. 291.—*Frame or Bed-pieces.*

If designed for a "sectional rigging," and to prevent side movement, a half-inch groove is cut into the lower sides of the cross arms, *P*, so that they fit closely upon the bed-pieces. To prevent a forward or backward movement, eight strong iron hooks are attached by staples to the sides of the cross-arms, and when placed upon the bed-pieces are readily hooked into the staples, *A*. Thus arranged, one man can easily place the rigging upon or take it from the wagon. Or, if desired, bolts may be used to fasten all together, by passing them through the cross arms and bed-pieces; there is not 25 cents difference in the expense.

Standards, *D*, can be either stationary, or hinged so as to be quickly lowered, raised or removed, by a small bolt, as shown at *Y*. The standards should be 6½ feet high, and quite strong, to withstand the pressure of the load, as well as to serve as a ladder. The boards *X* should be of of the same length as the bed-pieces, and one inch thick and six inches wide, of straight-grained light wood. Wooden pins or stakes, *N*, are inserted as shown, and should be only slightly sharpened. Should the hind wheels project above the boards *X*, bridge over them, as shown at *S*. Wash with petroleum, and keep under shelter when not in use.

Level for Underdraining.—Take a board of clear pine, 16½ feet long, taper it as shown in the cut (fig. 292), attach a leg at each end for its support, of exactly equal length, and a spirit level on the top. This level may be proved by placing it on a floor, and blocking it up until the bubble

stands level; if when reversed or turned end for end, it stands at the same point, it is correct. In using it, begin at the lower end of the proposed

Fig. 292.

ditch, and place a small board a few inches square under each leg. Then with a wedge raise the lower end till an assistant at the middle finds it to be level. Measure the height the leg has been raised, and that will be the descent for a rod. Keep a record of every rod, and add them all together, and that will be the whole fall. If the land is uneven and drops in some places, subtract the sum of these descents from the other sum. If the level is inconveniently long, one may be made 8½ feet long, or half a rod.

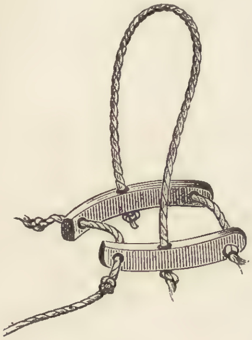


Fig. 293.

Halter for Orchards.—Col. Weld describes, in the Country Gentleman, a halter used in the island of Jersey for cattle running in orchards, as it prevents them from raising their heads more than a few feet from the ground. It is shown in the accompanying cut, (fig. 293,) the wood pieces enclosing the cheek bones, and the loose rope running under or behind the fore legs. It might be occasionally used in this country.

Miner's Subsoil Plow.—This implement combines lightness and strength in an unusual degree. The cut (fig. 294) shows its peculiar form, the acute point penetrating the earth easily, and the long wedge loosening up the soil with comparatively little draught. With a one-horse plow (weighing 35 pounds) and a single horse attached, we found no difficulty in running down nine inches into a compact clay soil. It is made by R. H. Allen & Co. of New-York.

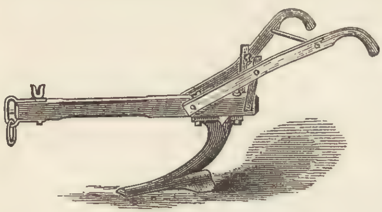


Fig. 294.

A Convenient Tool.—Mr. L. D. Snook sends the description of a convenient stable tool to the Country Gentleman, and urges its use as enabling the farmer to do the same work in considerably less time than without it. His description is as follows: The combined stable rake and

scraper is shown in fig. 295. The head *B* is made of hard wood, 14 inches in length, 4 inches wide, and 1½ inches thick, at one side tapering to ½ inch in thickness. Six or seven ⅝-inch holes, 2 inches in depth, are made upon the wide side, in in which are inserted sharpened hardwood pins *A*, projecting 3½ inches. The handle *E* is 4½ feet in length, and braced as shown. With the upper or sharpened-pin edge the best and unsoiled bedding can be hauled up in the stall, or it may be used for pushing out the refuse straw and manure that is quite difficult to handle with the smooth edge of the tool, which it is necessary to use for scraping out the finer parts.

Fig. 295.

Removing Boulders.—I notice an inquiry for the best way to remove boulders. I have had some experience with them, and have resorted to various means to get them off from my fields. I have broken them with fire; I have dug them out and drawn them off with three teams; I have buried a great many, and on one occasion came near being buried myself. But latterly I have employed men to break them with powder, which I think the cheapest and best way to get rid of stones too large to be drawn with one team. I took over one hundred of these troublesome pests from my cornfield last spring one of which cost $6.25 to get broken into pieces of suitable size to be drawn with one team. This monster made thirty-five large boat loads of fragments, many of which were very fine face stones for wall. The expense for breaking stones which will make three or four boat loads, with me, has been 37½ cents. Where land is worth clearing of boulders, the stones are valuable for fencing and should not be buried. If land is so occupied with stones that it will more than fence the land, it will not pay to remove them.—W. F. Baggerly, in Country Gentleman.

Rules for Farmers.—1. Select good land, and reject sterile, no matter how cheap.

2. Raise no weeds, but only profitable crops.
3. Underdrain, wherever needed.
4. Adopt a good rotation of crops and adhere to it.
5. Provide sufficient shelter for domestic animals.
6. Keep everything connected with domestic animals neat and clean.
7. Plow well, cultivate well, do all work well, and not slipshod.
8. Accumulate and save manure, and apply it properly.
9. Procure good implements, and take care of them.
10. Raise good animals and take care of them.

The preceding ten rules will be of much use if carried out, and we add two more, to cover them all, viz.:

11. By weighing and measuring, and with careful accounts, ascertain just what every crop or every animal costs you, and find out by this mode the market value of each.

12. Employ then those crops and animals which you find give you a good profit, and drop all else.

You can thus have the satisfaction of knowing that you are carrying out Ricardo's two famous rules for acquiring wealth, namely: 1. Cut short your losses. 2. Let your profits run on.

MEASURING HAY.—The weight of hay cannot be determined with accuracy by measuring; but some experience or a few trials will enable the owner to ascertain approximately without great deviation. Fine, flexible hay will pack closer than coarse, stiff hay; and that which is cut early will become more solid than dry, stiff, late-cut hay. The degree of dryness when the hay is drawn in, also affects the result. The compactness will, of course, vary with the height of the mow or stack. As a general average, however, under a pressure of ten feet or more, and with a medium degree of the other influences we have mentioned, about five hundred cubic feet of timothy will weigh a ton. Six or seven hundred, or even more sometimes, are required for clear clover.

OATS BY WEIGHT.—A French chemist analyzed a number of samples of oats to determine whether those of light weight are of equal value, pound for pound, with those that weigh heavier in proportion to measure. The result showed that the composition of light and heavy oats, when taken in bulk, is almost identical. A French postal contractor tried a similar experiment. Selecting out of 300 horses two teams of twelve each, in all respects alike, and treated alike, one team was fed for six months on oats, weighing 77 lbs. per hectolitre; and the other, for the same time, on oats weighing 117 lbs. per hectolitre. At the end of the period no difference could be detected in the two teams, the horses being all in excellent condition, and good working order. The oats were fed *by weight and not by measure;* and the conclusion is therefore that weight, and not measure, should be the standard by which they are bought and sold.

HEN MANURE.—Several estimates and experiments make the value of dry hen manure, in gardening, about $50 per ton; each fowl on an average consumes about one bushel and three-fourths of corn annually, or a little less than a gill and a half a day; and it has been found that one hen will yield about a bushel to a bushel and a third of manure per year. Various estimates make this worth from seventy cents to a dollar for each animal. It is very easy to save it, by placing the scrapings or cleanings of the hen-house in a barrel with thin alternating layers of road dust.

CUT-WORMS.—J. B. Root says that if balls of freshly cut clover are scattered through the garden or field, the cut-worms will be attracted to them, and can then be easily destroyed. We recommend, by way of preference, killing them at once, whenever their marks can be seen, without waiting for clover balls.

NOXIOUS WEEDS, AND HOW TO KILL THEM.

A DISCOURSE ON WEEDS is always in season from early spring till December, because they are always growing or scattering their seeds in some way during this long period. And the subject will not be exhausted, and hints will not become needless, while their annual cost to the Union is five hundred million dollars, or one-fifth the value of all the agricultural products of the country. This is not an extravagant estimate, for in many places the weeds eat out half the crops, and make the cultivation of what remains at least double the cost of clean management.

On looking back many years, we see the progress which has been made in the mode of attacking them, in successive gradations. Half a century ago the common injunction was to "pull up and remove carefully those which had gone to seed, to prevent the seeding of next year's crop"—to "be careful not to scatter the seed," which had been already borne in abundance—fig. 296. This was regarded as good and careful management. But an improvement was made on this mode, namely, by not allowing the seed to ripen—their formation was to be *prevented*—and, excellent idea as it seemed to be, under this improved treatment weeds were destroyed when half a foot high, more or less. But observing cultivators were not satisfied. They discovered that the labor of rooting out these full-grown or half-grown monsters was too great. They struck boldly, therefore for the destruction of these intruders while they were only an inch high. The labor was decreased incredibly. There was a great difference in the force required to crush a delicate little organization as large as a cambric needle, and one a foot high, with roots like strong horns branching and penetrating the soil another foot, and lifting the plants of the crop when torn out. The improved mode lessened the labor ten, twenty or thirty fold. The great point then was to take the weeds in time, and it was found to be better to pay a man five dollars a day to destroy them in their feeble and delicate condition, than at fifty cents a day when stout and shading the whole crop.

Fig. 296.—*Pig-Weed.*

But a still farther improvement was made, and this was to destroy the weeds before they came up, when they were just beginning to send out their minute white fibres from the seeds. In other words, the steel rake, fine harrow or cultivator, is passed over the surface while it is yet perfectly clean. The process consists in simply mellowing thoroughly the whole surface without waiting for any of them to make an incipient appearance.

Any one may easily estimate the comparative difference in cost between these four modes. Wait till the weeds ripen their seeds, and then carefully pull them up and place them in a heap; pull them up, or hoe, or plow them, when a foot high; or destroy them when a single stroke of the rake or sweep of the harrow kills them by hundreds at a single movement; the last mode exceeds in economy the first at least fifty or a hundred fold.

It is well worth while to contrast *finger weeding* with the wholesale destruction by means of the two-horse harrow. The contrast may be less striking in the garden bed, where finger work is performed side by side with the hand rake or the sharp hoe; but on a larger scale—on the broad acres of the farm—the difference is enormous. The truth is, no good farmer should ever use a hoe—or very rarely. The summer fallow for eradicating all foul stuff, where this has obtained possession, is not sufficiently appreciated. What are termed *hoed crops* are too costly when cleaned by hand. The single horse cultivator is quite slow enough in in its work. Some crops are made quite clean, when small, in a rapid manner, by means of the smoothing harrow, which sweeps over the whole surface; and all others, that is when the land is not already clean or cannot be treated with this harrow to render it so, should be occupied with broadcast crops.

Fig. 297.—*Purslane.*

Fig. 298.—*Canada Thistle.*

Fig. 299.—*Quack Grass.*

These remarks apply mostly to annual or biennial weeds, such as rag-weed, fox-tail, red root, pig-weed or purslane (fig. 297.) To clear foul land, it is necessary to plow and harrow many times, to bring up successively the seeds which lie at different depths, and which will not germinate till brought to the air. But perennial-root weeds, as Canada thistle (fig. 298), milk-weeds, quack-grass (fig. 299), &c., which spread mostly by the roots,

may be thoroughly eradicated in a single season, and at little expense, by plowing often enough to keep the leaves perpetually under. While Canada thistles and quack-grass have been easily rooted out thus in four or five months, the work being thoroughly done, it would never be accomplished if occasional cessation were permitted, so that the plants could get a little breathing spell above the surface, and the labor might continue a hundred years or more.

To recapitulate then: For annual weeds, kill them in earliest infancy, while minute and fragile, and easily swept off by myriads; and for perennials, never let a solitary leaf appear above the surface, and the work will be speedily and cheaply accomplished.

ORNAMENTS FOR PLEASURE GROUNDS.

CHEAP RUSTIC FOUNTAINS.—The following description is given by G. MURCH in the COUNTRY GENTLEMAN:

A (fig. 300) is the fountain basin or pond; *B*, a barrel to contain the water; *C*, an iron or lead pipe, or pump logs, conveying water from the cistern to the jet; *D*, a jet or rose. The barrel may be hidden behind a fence or wall, a tree or clump of shrubs, or wall of rock (fig. 301), as circumstances, nature of ground or taste may determine. If rock-work is used, a cave or grotto might be built—not a bad place in which to read the COUNTRY GENTLEMAN for an hour on a sultry day. The pockets or holes between the rocks may be filled with soil and planted with ferns, rock plants or annuals.

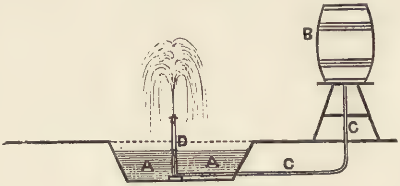


Fig. 300.—*Cheap Fountain.*

If the fountain is on the lawn, the grass might be carried to the edge of the basin; if on gravel, the gravel should reach to the basin; if on a terrace, the basin might be edged with dressed stone, or edging tiles, but a rustic fountain is best edged with rock-work. A border for flowers might surround it, but in that case one or more open spaces should be left to allow people to walk to the edge, to view the goldfish, &c. Several different jets should be used for variety, not omitting the revolving jet.

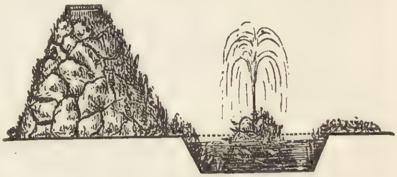


Fig. 301.—*Fountain Finished.*

With a little taste a fountain might be a permanent object of beauty. In many places there are spots (and often not far from the house) where a fountain, a cave or a cascade might easily be formed. There is often a dell or gully, a little ravine, or even a quarry-like hole, an eye-sore to the place, yet there is perhaps a small stream running through it, or a spring or stream near from which the surplus water could easily be carried through a ditch or pump-logs to the head of the gully. Then from pond or dam lay pump-logs or pipes from thence to the centre, or the most suitable place for the fountain.

SUMMER HOUSES.—These add to the attractiveness of ornamental grounds in secluded spots. A seat where girls can sew or read in the fresh open air, will more than pay for itself by the health it will preserve or impart. Farmers of moderate means may enjoy them. We built one for $15 according to the following design ; any carpenter can do the work :

First, procure eight round posts about seven inches in diameter, which may be of red or white cedar. Other straight, smooth timber will answer.

Fig. 302.

Drive a stake or peg into the centre of the spot where it is to stand, and by means of a cord attached to it, and with a sharp stick tied at the other end, proceed to scratch a circle on the ground. The circle will be of the same diameter as the summer-house ; about eight feet is a convenient size ; but if for only a few persons, six feet may do. Divide the circle into eight equal parts by a measuring stick of the right length. Set a post at each end of these parts—about 1½ feet in depth—or even a foot, if the posts are made stiff by pounding the earth compactly about them as it is thrown in. Then with a level mark the top of each post, so that all may be sawed off at the same height (about seven feet), and on these flat ends nail pieces of boards to form the plates. Other pieces set under these on edge, 3 or 4 inches wide, will stiffen them. The octagonal roof is then placed on these plates, made of inch boards, and battened at the joints, as shown in fig. 302. If a floor is intended, it is next laid on small joists. If no floor is laid, clean

gravel will make a good floor. Next, brackets are attached to the inner side of the eight posts, and an octagonal seat made of seven pieces of boards, extending around the whole except the entrance, is placed upon them. Seven strips of ½-inch board, a few inches wide, nailed from post to post, form the back of the seat. It is now finished, ready for the coat of crude petroleum, which it should next receive, and which will give it a rich brown color, and render it as durable as cedar. The petroleum should be copiously applied, which may be done with a common whitewash brush, and two gallons are enough to do the work thoroughly. Rough boards are used for all except the floor and seat, and if the posts have the bark on (which will adhere if cut when not growing), they will present a more ornamental rustic appearance. Common strips of lath form the lattice work, and are nailed between all the posts, with the exception of one space left for entrance.

SUGGESTIONS IN HOUSEKEEPING.

THE FOLLOWING ARTICLE, written for the ILLUSTRATED ANNUAL REGISTER, is from the pen of a skillful young housekeeper, who gives the result of her own experience, and it may furnish valuable hints to other young housekeepers :

Old newspapers are useful in many ways. Under carpets they save wear and keep the floor warmer by covering cracks. Over the edge of each step, under stair carpets, they are almost indispensable, and serve a better purpose than clumsy carpet pads. A newspaper folded across the chest and buttoned under the outer garments, protects the lungs in a long, cold ride. Newspapers are equal to chamois skin for rubbing windows after they are washed and wiped. Zinc under stoves is better polished by rubbing with dry paper than by washing. Dampened paper is good to rub up and brighten the kitchen stove.

Whiting and water cleans white paint and window glass nicely.

Kerosene oil applied with a feather to every crack and corner of a bedstead will expel bed-bugs.

Kerosene rubbed frequently into unvarnished furniture, beautifies it very much.

A piano or other handsome piece of furniture, sometimes becomes dull in appearance. The following means will produce a high lustre: Wash the article in nearly cold water, with a very clean, soft rag, and wipe it dry. Next rub it all over with sweet oil, and leave it to stand an hour or more. Then rub off all the oil with a towel—rubbing till no more oil comes off upon the cloth—and the furniture will shine like new. This is only to be used on varnished articles.

Dining tables, if varnished with furniture varnish, are easily spotted with

white by hot dishes. But if *coach* varnish is applied, such as is used on carriages, the table will always remain bright and uninjured.

If you use a carpet-sweeper, you will find it takes up the dust better if you press upon the handle while working it. A sweeper does not raise dust like a broom, and is therefore good among nice furniture, embroidery, &c. Much strength should not be used in sweeping with a broom, it wears out the carpet; but short, light strokes, plenty of light, and observant eyes, are requisite to get the floor everywhere clean.

Powdered alum is a safeguard against moths, when applied to every crack in the floor and around the edges, and under the baseboard, under a carpet. It is also considered a security against the carpet bug. Some ladies powder the whole floor with it before putting down a carpet.

A very good fly-trap is made by filling a teacup nearly full with suds, and covering with thick paper smeared on the under side with molasses, fig. 303. Cut a hole large enough for the flies to crawl in easily. They are best caught in a rather dark place.

Save bits of oilcloth for lamp mats. An old pie-tin makes a good tray on which to set lamps through the day, as the kerosene is apt to leak over and spoil shelves. Glass lamps with a ledge around the top of the reservoir never run over, and are always clean to the touch.

Fig 303.—*Fly-Trap.*

If a light is needed through the night, a taper is preferable to a lamp, avoiding smoke, gas and too much light. A box of tapers can be cheaply purchased; but they can be made at home in the following manner: Cut a circle of soft paper, about two inches in diameter, fold it so that you can get hold of the central part of it, twist up a point of it in the centre, so that the point will be sharp, and about half an inch long; tie it closely at the base of the twist with a thread, and spread out the untwisted part of the circle at right angles with the twisted point. This is the taper, and the point is to take the place of a wick and draw up the grease to burn. When used, set it on a thin piece of cork in a saucer of lard, and light the tip of the point—fig. 304.

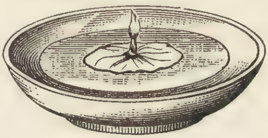


Fig. 304.—*Taper.*

A window mop on a long pole is a convenience for washing the outside of windows. Perhaps an ingenious person might contrive a home-made article which would cost nothing. They are sold for a dollar and a half, but will last long and save much time and much effort in reaching.

Clean sinks with a whisk broom, and scald them daily. A clean toothbrush is good to scrub the metal strainer of a coffee-pot. Cut a potato in two, and use the cut end to dip in bath brick for scouring knives—the juice of the potato helps to cleanse. Keep whiting near at hand when you wash your silver, and scour off any little spot at once. Clean silver often.

It is much easier to keep it bright than to make it bright after long neglect. There are many nostrums sold for scouring silver which leave it permanently tarnished a little while after using. Good housekeepers say the best thing for silverware is "elbow grease."

Diluted carbolic acid is good to pour down drains and sprinkle about cellars; so is diluted bromo-chloralum. It is best applied with an "atomizer" or sprinkler of some kind. I once sprinkled a sick chamber with it by hand, undiluted, and it left little sticky, black spots on the carpet for a long while.

If your stairs are varnished, wash them with clear warm water. Soap makes varnish look dull.

Wash toilet brushes in warm water (without soap) and a few drops of spirits of ammonia. Dry them in the sun. The ammonia cleanses quickly and thoroughly, and the bristles will not lose their stiffness.

Careless painters sometimes drop paint on window glass. A house-cleaner told me that benzine, applied to the spots and left on them a little while, will remove them when washed off.

In a cold climate waterpipes in the second story of a house are very liable to freeze. A small stream of water should be permitted to run night and day, during severe weather, to prevent this. If the pump handle is not put up at night, and water freezes in the pump, thaw it out patiently with cold water. Domestics hurriedly dash in hot water, the ice gives way, but the leather is injured, and they have the pleasure of "priming" the pump every time it is used thereafter.

If you don't want to break glass goblets, preserve dishes, &c., when you wash them, lay them *sidewise* in the hot water, and turn them over a few times; they will not break, even in boiling water, because all the parts will be expanded equally and at once. To break them it is only necessary to stand them up in the dish-pan and pour on hot water.

When canning fruit, the glass cans should always be partly filled with cool water, set in a pan of cool water on the stove, and heated gradually till the moment you wish to put in the fruit—the hot preserves will not crack hot jars.

Some people have a contempt for calico. They are generally of the careless and slatternly sort. A woman who knows how to do up calico nicely will appreciate the clean, neat dress, however cheap. If a calico dress is washed carelessly, starched stiffly, sunned a day or two, and half ironed, it is not a very comely sight. But if quickly dried in the shade, very thinly and evenly starched and ironed on the *wrong side*, so that it will not shine, it will look like a new dress for a long time. Many pretty blue prints and cambrics fade when washed in the usual way. If they are washed the first time in strong salt and water, or water to which a little beef's gall is added, the color will be set so that they will always be as handsome as at first, and can be washed ever after like other colored goods.

Scald out all fruit stains, before washing, with boiling water.

Ink stains, while fresh, can be removed from white articles by soaking in milk. If ink is upset on a woolen table cover, take it up quickly with blotting paper, and it will never show.

A superior laundress tells me that obstinate spots in soiled clothes are removed by wetting them with a strong solution of borax, and exposing to the sun awhile before washing.

Complaint is often made that wringers tear off buttons. When you wring your clothes draw them through so that the buttons lie flat while passing through the rollers, so that there will be no strain upon them.

A folded sheet is better than a blanket to spread over a mattress and under the sheets; being more easily washed, it can be frequently changed. Cotton pillows are preferable to feather pillows, being cooler to the head. You can make a pretty and durable "comfortable" of white paper muslin, knotted with scarlet or blue yarn or worsted. Cradles should have a large wire hoop fastened near the head, to hold up a cover to protect the child's head from currents of air, and for hanging a mosquito net during fly-time. A large box, the shape and size of a lounge, cushioned on the top and covered with chintz, with the cover on hinges, to be opened at pleasure, makes a convenient stowing-place and cheap couch. If wished, the interior can be fitted with shelves and tills.

A piece of an old Turkish towel makes a good duster. Turkish towels also make nice wash-cloths cut into proper shape and neatly fringed.

Bright-colored, striped wash goods, or white muslin bordered with a row of pressed autumn leaves, make very pretty, cheap lambrequins for bedroom windows.

Pretty rugs are made very cheaply of coarse sacking, such as is used for packing. Cut it of the right shape, fringe out the edges, and work a border in cross-stitch at a little distance from the edge—fig. 305. Germantown wool, which is much cheaper than zephyr, is suitable for this. A monogram in the centre has a good effect.

To make a very beautiful hanging basket, tear coarse bleached muslin into strips, ravel down the strips till only two or three threads of warp are left, so that the strips are nearly all fringe, and loop them over a wire foundation, (fig. 306,) with a large tassel at the bottom, and cords to suspend all of the fringed material. Even half an egg-shell, with a crotcheted open-work cover, makes a nice little hanging basket, in which you can raise a few grains of wheat, or a tiny plant

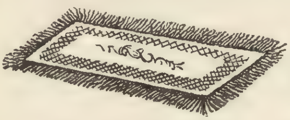


Fig. 305.

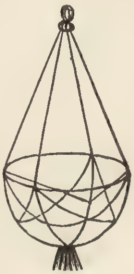


Fig. 306.

Save old stockings and worn "gauze" underclothing. They make strong, elastic patches for other garments of the same kind, and for cotton

flannels. When cloth is stretched by tearing across a breadth, the edge may be straightened by creasing it down in narrow folds with the fingers, a little at a time, beginning in the direction opposite to that from which it was torn.

Nervousness and restlessness in warm nights may be often prevented by a cold bath in a large tub, or better still, in one of the hat-shaped bath tubs which ought to be in every country house—which are light and portable, and afford a refreshing bath with very little water. Feverishness is much allayed in sickness by washing the patient all over in water containing a little soda dissolved in it.

The heads of infants are sometimes injured by the remorseless use of the fine-toothed comb. A little sweet oil applied to a young infant's head, and washed off carefully is useful. For an older child, rub on raw yelk of egg before gently combing.

Creeping babies are spared many bad colds in winter, if their limbs are protected with cotton flannel drawers reaching to the knee. The drawers should button to a waist at the top, and button up and down the whole length of the sides also, so as to be taken off easily.

A farina kettle (which is a double pail, the outer one to hold water, the inner one for cooking,) is an important piece of kitchen furniture, as you can then boil custards, puddings, oatmeal, &c., without risk of burning. The large ones which hold most water are best; in those which have a closely fitting water-boiler there is danger of the drying away of the water before the dish is cooked.

Dont fry your beefsteak, but if you like gravy with it, broil it, after pounding, in an empty, hot spider; turn it over many times, and when sufficiently done, take it up on a platter. All the juice of the meat will be left in the spider. Add a little hot water, and thicken with flour and water smoothed together, for the gravy. Steak is usually spoiled in one of three ways: 1. By not pounding it enough. 2. By not turning it often while cooking. 3. By crowding too much into the spider at once, so that it cooks unevenly.

The following method of making currant jelly, which we have practiced for more than twenty years, will be found to save trouble, and afford a good article. For straining the jelly two pieces of board, shaped to form handles on one end, and hinged together with leather at the opposite end, form a good squeezer, saving the hands from burning. Put the currants (with the stems on) in stone jars and cover them. No leaves must be put in, for they are bitter. Set the jars in warm, but not hot, water over the fire. When the water boils, and the currants are warm and somewhat sunk in the jars, strain through a linen or flannel bag. To every pint of juice allow one pound of loaf sugar. The sugar is not to be cooked at all. Put it in a clean milk pail. Put the juice into a brass or porcelain kettle; boil it about five minutes, (not longer;) pour it boiling hot upon the sugar, and stir till all the sugar is dissolved. Then put it in bowls, glasses or jelly moulds. Paste on white paper covers. It will be thick in a few days.

THE

ILLUSTRATED ANNUAL REGISTER

OF

RURAL AFFAIRS.

CONSTRUCTION OF BARNS.

IT WAS A FORMER PRACTICE to place the barn buildings in the form of a hollow square, surrounding and sheltering the cattle and manure yard. The practice is now becoming more common and approved to group nearly all the accommodations in one building, as it is more compact, less expensive in erection, is warmer in winter, and saves much labor in attendance by placing everything near at hand.

The old practice of scattering buildings over the farm, to save drawing crops, has been found more expensive than to concentrate them, the saving

of labor in drawing being less than that of passing to the buildings two or three times a day in winter. It is cheaper to draw a load of hay half a mile in summer, than to go the half mile a dozen times in feeding it out.

The Required Size.

The farmer who is about to erect new farm buildings, or to add to his old ones, should first figure up on what he will wish to store in them. These contents will depend entirely on the size of his farm, the character of his farming, the number of domestic animals of each kind, and the amount of the farm machinery, for which he should have ample shelter. Among these contents he may enumerate :

1. Space required for hay—the bays or mows.
2. do. do. unthreshed grain—the bays.
3. do. do. threshed grain—the granary.
4. do. do. cattle—the stables.
5. do. do. horses—the stables.
6. do. do. sheep—the sheds and pens.
7. do. do. wagons in use—shed or house.
8. do. do. storing all tools—large tool room and place for storing machines.

The piggery, poultry-house and corn-house may be in separate buildings, and the repair shop attached to either of the latter.

Every barn should have a basement, both for the sake of the room it affords at moderate cost, and for the protection of the sills and other timbers of the barn, if built of wood. The foundation should be of substantial masonry, below frost, and with perfect drainage throughout. The earth is best if dry gravel ; but farmers have to take such soil as they find, and if moist or clayey, it requires the most thorough system of tile or broken-stone drains throughout. The ground, if possible, should be sloping, to make drainage easy, and to open freely to the apartments from the yard below, as well as to provide a sloping bank for entering above. The basement may be occupied with the root cellar, water troughs, cattle stables, and, to a certain extent, and under special precautions, with manure. It is too damp for horse stables, unless the ground is dry gravel, and the whole made free from dampness. If the ground is retentive of moisture, it must be not only well drained, but a space of a foot or more between the foundation walls and the earth bank should be filled with broken stone or gravel, connected with a drain below. This will not only protect the walls from the heaving of frost, or the pressure of earth, but make the stables much drier.

Since the introduction of the horse-fork, three-story barns are not so important as formerly, although still possessing some valuable advantages, and barns may be built higher than before, and more room thus secured under the same extent of roof. A height of not less than 20 feet from basement walls to eaves may be adopted.

Whatever may be the capacity or character of barns and their surroundings, or their expense or cheapness, the farmer should adopt the determination at the outset that everything shall be kept in neat and perfect order. If he has large means, he can indulge in some degree of elegance and architectural beauty; if his means are small, he may have convenience and cleanliness, instead of awkwardness and repulsiveness, with no additional expense. If he cleans his piggery twice a day, and keeps it free from all offensive odor, he has no more of cleanings to throw out in the aggregate than if he cleaned it but once a week. A free use of litter and absorbents in his stables and manure heaps, and good ventilators, will prevent fœtid fumes, and give him healthy animals.

Details of Estimate.

To come to the details of required space, it will not be difficult to estimate them with some accuracy. We will take an example: Suppose he has a good farm of 100 improved acres; 20 acres are in meadow, yielding 40 tons of hay; 20 acres in wheat, oats and barley, yielding about the same bulk before threshing; he has 5 acres of sown corn-fodder, a part of which he wishes to store in different parts of his barn, and a part he will leave in small, ventilated stacks for late fall feeding; he keeps 100 sheep, 4 horses, 10 head of cattle, and 10 pigs. Among his tools and machines needing storage and shelter he has two farm wagons, a mower and reaper, seed drill, two horse-rakes, with a number of smaller articles, such as harrows, cultivators and various hand tools.

Now, the 40 tons of hay should have 600 cubic feet per ton allotted, allowing for settling and space to work, and the same space for the unthreshed grain—which will be 600 times 80, or 48,000 cubic feet for hay and grain. These would require a bay 20 feet wide, 80 feet long, and 20 feet high, and another half this bulk, or 10 feet high; or equivalent space. As these bays settle in autumn, a quantity of fodder-corn may be placed on them, for feeding out early in winter. The four horses will need a space 14 by 20 feet for stables; the 10 cattle, if stabled, will require about twice this room; and the 100 sheep should have a sheltered space under the barn or sheds.

The tool-room or wagon-house should have a space equal to 20 by 30 feet in all.

It will be seen by this estimate that many barns are quite too small, and if the farm goes on improving in fertility and products, as most farms should in good hands, the room provided should be larger rather than smaller. In other words, a barn large enough to house and handle its products and machinery, should be equal to a building 40 by 60 feet, 20 feet posts, and a basement under the whole with at least 8-foot walls.

Exterior Covering.

The question has been discussed whether well built wood barns, with planed and thoroughly painted sides, are not cheaper in the long run than

buildings covered with rough boards and not painted. The interest on the additional cost of high-priced, planed boards, and of frequent painting, it is claimed, will be sufficient to replace a new covering every twenty years with rough and cheaper material. This question may be easily settled by any one, by ascertaining from a builder the cost of say 10,000 feet of surface planed and painted, and of 10,000 feet of cheap and rough boards.

There are, however, other considerations than cheapness in the erection of farm buildings. It has been too common in some places to give no attention whatever to ornamental or picturesque appearance. Hence the common remark that trees should be planted to hide the repulsive barns. The true rule, on the contrary, is to render every part of the premises neat and attractive. The barn should be a pleasing object; it should convey to the eye of the spectator the impression of comfort and completeness in the farm arrangements. A farm with a dwelling-house alone visible would seem to be only partially furnished. It may therefore be well for every farmer who has the means, to give to all his outbuildings an attractive exterior and finish; and even those who have small resources, may have symmetry and architectural character to a rough building, on the same principle that well executed rustic work is better than costly and elaborate structures without taste.

The remainder of this article is chiefly occupied with designs of barns, furnished by several distinguished agriculturists, who have given special attention to the arrangement and construction of farm buildings; taken together, the designs comprise a series of much excellence and practical value.

Prof. Roberts' Barn.

The plan of the barn furnished by Prof. J. P. Roberts of Cornell Univer-

Fig. 308.—*Prof. Roberts' Design of Barn.*

sity, contains many excellent arrangements and provisions. The basement is 9 feet; posts, 20 feet. The main floor is 40 by 60 feet, with a wing of the same height, 30 by 40 feet, (fig. 308.)

Fig. 309 is a plan of the principal floor. A drive or floor twelve feet wide extends lengthwise through the main portion. On the left is a cow-stable for fifteen animals; on the right are stalls for seven horses, a granary, and a passage where the threshing machine is placed when used. If desired, the horse stables, or a part of them, may be box stalls; or they may be made into cattle stables; or, if less stable room is desired, and more floor or grain room, the stalls may be

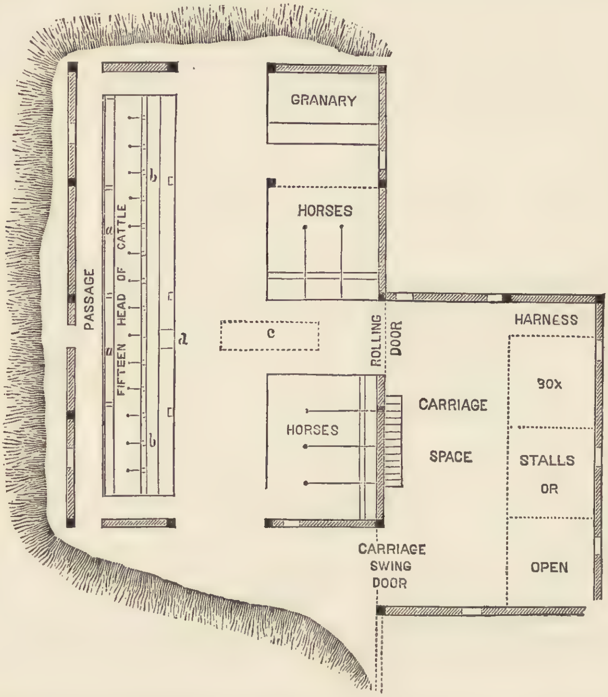


Fig. 309.—*Principal Floor—Main portion*, 40 *by* 60 *feet; Wing*, 30 *by* 40 *feet; Cow Stable*, 13 *feet wide—Stalls*, 3½ *feet wide; Horse Stable*, 14 *feet wide—Stalls*, 4¼ *feet*; a a, *Manure Gutter*; b b, *Stanchions*; c, *Position of Threshing Machine*; d, *Movable Boards to admit Band from outside.*

omitted altogether, or in part. The wing is used as a space for carriages or wagons, and the three box stalls may give place to more wagon room if desired. The slope of the ground allows sufficient rise to drive wagons through, and the left side of the basement is mostly protected by a bank. The next floor at the front entrance is a few feet higher for a portion of the distance, to allow high loads of hay to pass,

till pitched off with a horse-fork. The rest of the distance is lower, to allow more space to the loft. Fig. 310 is a plan of the grounds.

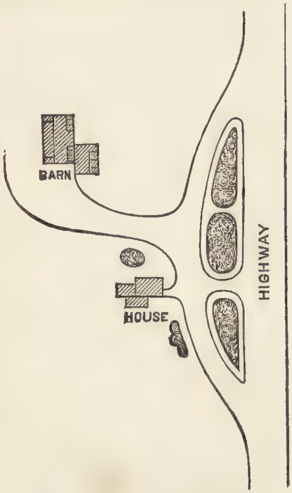


Fig. 310.—*Plan of Grounds.*

DETAILS.—The platform on which the cattle stand is 4 feet 9 inches wide at one end, for the larger cattle, and 4 feet 5 inches at the other for the smaller —(fig. 311.) When cattle vary much in size, a greater difference may be necessary. If too narrow or short, it causes abortion; if too wide, the animals become soiled in lying down.

The best way is to place the cows rather compactly together, and then if there is but one milker, to begin at one end, and as soon as each cow is milked, to turn her out, thus leaving room for the next one. If there are more cows than one man can milk, others can begin at regular intervals, and as soon as one cow is discharged, ample room is made for the rest.

A peculiar and special provision for clearing away the droppings is adopted in this stable. The manure gutter (*a a*, fig. 309), 18 inches wide

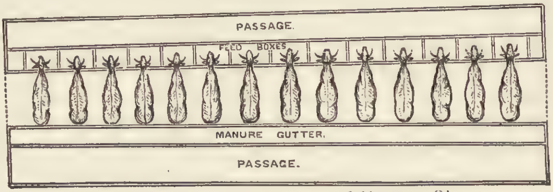


Fig. 311.—*Stanchions for Cows of Varying Size.*

and 8 inches deep, has a movable 2-inch plank, 8 inches wide, forming the rear side, spiked to another 2-inch plank along their edges, at right angles, as shown in cross-section by fig. 312. When the mamure is to be cleaned from the trough, this movable portion is lifted by turning at its hinges, as shown in the cut, making an opening at the rear side of the manure trough, through which the manure is rapidly thrown with a shovel to the manure cellar below, and when it is thus cleared, the plank cover is replaced, and all is closed. Each of the movable plank

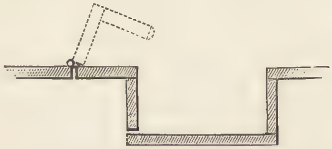


Fig. 312.—*Section of Manure-trough, with mode of throwing open rear side.*

covers are 14 feet long, and the trough is divided into four portions. The troughs are held in their places at the ends by a bent iron bar or stirrup, in the shape shown by fig. 313. If the trough is too shallow, the cattle will stand in it; 8 inches proves the best in depth.

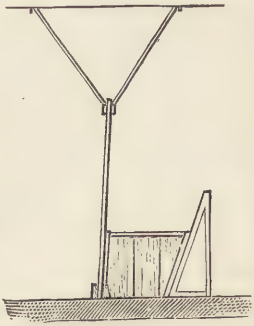


Fig. 314.—*Section of Feed-boxes and Stall-yokes.*

The platforms on which the cows stand slope about one inch from stanchions to manure gutter. The stanchions are made of hard wood, planed and oiled. They incline slightly from the cattle, so that in rising there is room enough for the forward movement of their heads, as shown in fig. 314.

Fig. 313.—*Iron-rod Stirrup for holding Manure Trough.*

Short windows to the line of the cow stables are placed so high as to be out of the reach of the animals, and the sash is made to slide horizontally, and may thus be opened to any degree for the admission of air.

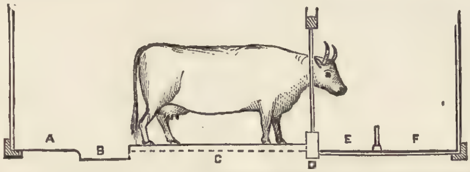


Fig. 315.—*Vertical Cross-Section of Stable*—A, *Passage*; B, *Manure-gutter*; C, *Platform*; D, *Stanchions, which should incline slightly from the Cows' heads*; E, *Feed-boxes*; F, *Passage.*

In using the threshing machine, the engine or horse-power is placed at the left, on the outside of the building. For this purpose the driving-belt passes through the open door, and the feeding box *d* (fig. 309) being movable, it passes directly to the threshing machine *c*, from which the straw is taken by the carrier to the loft over the carriage-house, and is packed away by men standing above to receive it. The unthreshed grain, occupying the space over the granary and horse-stables (or the whole space if a part or all the stables are omitted), is easily pitched to the machine. If these stables are omitted, the horses may occupy the stalls in place of the boxes in the wing, and such portion of the loft above as may be desired devoted to space for the straw.

Fig. 316.—*Section of Floor of Horse-stables.*

The floors of the horse-stables are made of scantling, 2 by 4 inches, set on edge, with spaces between them of a fourth of an inch—fig. 316. These spaces are left open for about 2½ feet near the horses' hind legs, where their droppings fall, and

the rest is closed by thin boards on edge between them. The advantages of this floor are in allowing the drainage or liquid manure to pass through into the basement, leaving the horse manure comparatively dry, which is then wheeled across the floor to the cow-stalls, and used as bedding, and becoming thus mixed with the cow droppings, makes a better manure than when they are kept separate. It makes a soft bed for the cows, and prevents the hair from wearing off the knees, produced by rising on a hard floor. The constant drainage causes the floor to last longer. To prevent the liquid manure from dropping all along these openings to the floor of the basement, a board trough 2½ feet wide is hung under the openings, lower at one end, and whenever the stables are cleaned, this trough is also cleaned with a light long-handled hoe.

Fig. 317 is a section of the mode of framing the truss of the wing or wagon-house, so as to clear all obstructions. It is, of course, used only for the interior of the wing, and not for the outer walls, where it is not needed. It will be observed that the braces are set in the horizontal timbers a short distance from the ends, so as not to crowd against the wall.

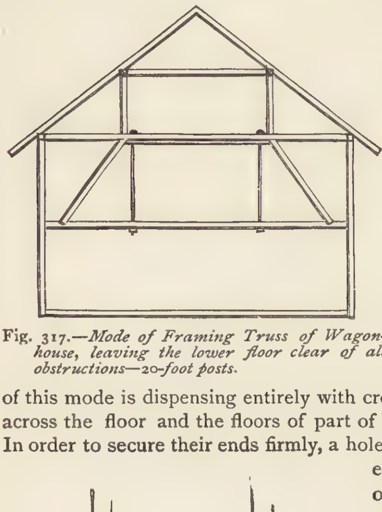


Fig. 317.—*Mode of Framing Truss of Wagon-house, leaving the lower floor clear of all obstructions—20-foot posts.*

The barn floor, extending lengthwise through the main barn, should be made of plank laid lengthwise,(and not across, as is common,) as this position of the plank makes a smoother floor, and which is not so soon worn out. Another advantage of this mode is dispensing entirely with cross timbers, the joists being laid across the floor and the floors of part of the stables, and serving as ties. In order to secure their ends firmly, a hole is bored with an auger near the ends, after they are laid, one-half of the hole being cut in the joist and the other in the timber. A round wooden pin driven into this hole renders them immovable—fig. 318. This is a simple and rapid way to fasten them.

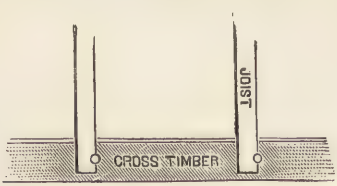


Fig. 318.—*Mode of Securing the Ends of Joists.*

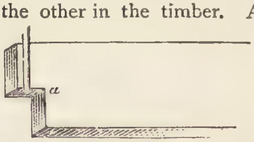


Fig. 319.—*Joist with weak Tenon.*

Fig. 319 shows the common way of making the tenons on joists, half

being cut away, they are weakened, and are liable to split at *a*. If the tenon is made wider, the cross timber is weakened to receive it. A better form is shown in fig. 320, where the tenon receives nearly all the strength of the joist, and the cross timber, being cut to receive this peculiar form, is weakened but slightly.

Fig. 320.
Joist with strong Tenon.

Fig. 321 is a section of the meal-bin, its contents being always accessible at the lid, *a*, shown lifted by the dotted lines. Joists at bottom laid near together and covered with a wire screen, give ventilation and exclude mice. The sides are smooth hemlock, which mice will not gnaw.

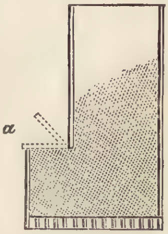


Fig. 321.
Section of Feed-bin.

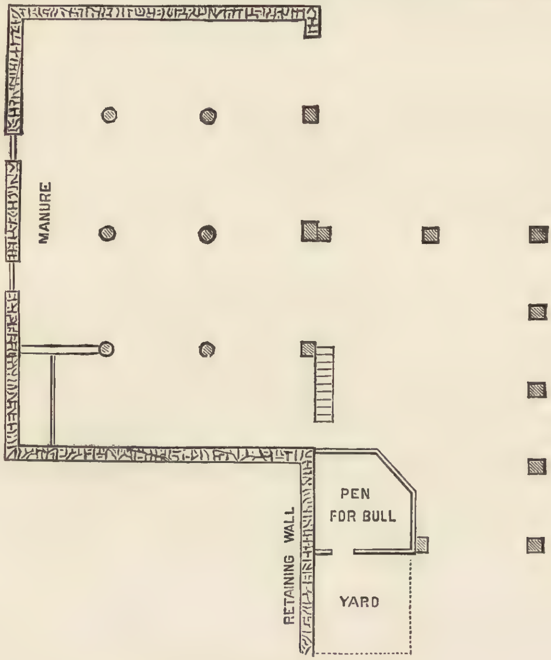


Fig. 322.—*Basement—9 feet high.*

The basement (fig. 322) is used for manure on the left side, or under the cattle, and the rest may be occupied with wagons, carts, plows and

coarse implements generally, and also as a shed for animals. The box for the bull is placed next the retaining wall; and outside of this is a small yard for exercise. He is easily seen from the bank above. The box is boarded vertically, and not horizontally, as he easily hooks or tears off horizontal boards. If this box and yard are not needed for a bull, a stallion, or colts, may be kept there.

The bank, which extends around the three sides of the basement, is best if the building is so arranged that it is on the west side. But if this position cannot be controlled, the barn must be made to fit the position according to circumstances. The three sides must be solid stone wall. In building it, the excavation should be nearly a foot wider than the space which the wall will occupy, which should be built up nearly smooth on the outside; otherwise the projecting points of the larger stones used in building it, against the earth, render it less secure, and the freezing and thawing of the earth tend to loosen and overthrow the wall. Under this space, between wall and earth, should be a drain, 8 or 10 inches below the bottom of the wall, with a pipe tile. The space is then filled with gravel or small or broken stone.

The posts in the basement are simply the trunks of white oak trees, or other hard and durable wood, with the bark removed. These are better and smoother than square posts with their corners. Projecting knots or short stubs of limbs towards the top may serve as pins for hanging up tools

Cattle Barn at Michigan Agricultural College.

Through the assistance of Prof. Beal we are enabled to give a plan and

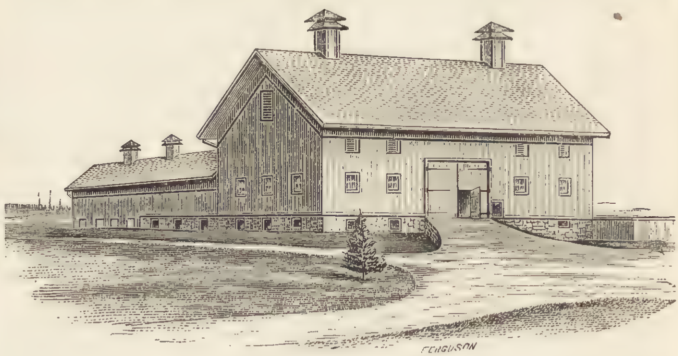


Fig 323.—*Cattle Barn at Michigan Agricultural College, from the Southwest.*

description of the cattle barn on the grounds of the State Agricultural College at Lansing, Michigan; and although Prof. Beal thinks it is not a perfect model, it will be found to possess many points of value, which farmers who are about to build may imitate.

It is a side-hill barn, 40 by 60 feet, with the end to the south, at which, as seen in the basement plan, (fig. 324,) are double doors, and on each side of these, near the corners, are 4-foot doors, for the passage of the cattle. The central alley is 12 feet wide, the floor of which, and that of the stalls on each side, are all tarred and placed upon a grout bottom, so that there can be no rat-holes beneath. The stalls for the cattle extend along on each side of this central alley. The earth being banked against the outer walls of the apartment for roots, prevents freezing; and the room for mixing the feed is partly protected in the same way.

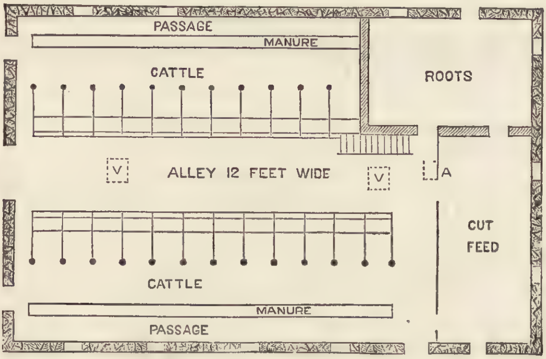


Fig. 324.—*Basement*—A, *Root Pulper*; V V, *Ventilators and Hay Shoots from Doors at different heights.*

The planks forming the mangers next the cattle are movable, so that by taking them out and dropping them into grooves for the purpose, the space between the mangers and the manure gutters may be increased or diminished according to the size of the cattle. The planks forming the sides of the manger next the alley, should be slanting, or wider at the top, to make it easier to put in the feed, as well as to prevent the cattle from scattering the food over into the alley. The cattle are fastened with a chain about the neck, with the other end attached to a vertical rod at the side of each stall. As the ring moves freely up and down, ample room is given to the animals. In the rear are low windows Over the passage at the rear are two ventilators, 3 feet square, reaching to the roof. The roots are conveyed through side windows into the root room. At *A* is a root-pulping machine, driven by a tread-power above.

The stalls vary in width from 3½ to 4 feet. From the edge of the manure trough to the end of the stall next the alley is 7½ feet for large cows, and 6 feet 7 inches for small ones, with intermediate dimensions as required. The slanting planks dividing the stalls and alley are movable, and drop into grooves at different distances, so that the stalls may be made long or short at pleasure, with similar ones for mangers. The mangers are 2 feet

wide inside. Th manure gutters are 20 inches wide, and about 5 inches deep. The manure is wheeled out with a wheelbarrow. The passage at the rear ot the stalls is 3½ feet wide. The basement walls are 2 feet 9 inches thick at bottom, tapering upwards on the inside to 15 inches at the top.

On the floor above (fig. 325) is a cutting machine and stalks, straw, &c., cut by horse-power, and run down a spout, after cutting, into the feed

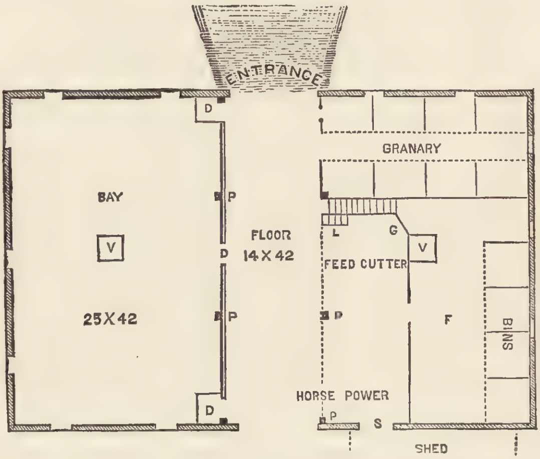


Fig. 325.—*Second Floor*—D D D, *Doors opening down to rear of Cattle and Feed Alley below;* ,F *Fanning Mill, Bag-holder. &c.;* V, *Hay Shoot and Ventilator, adjoining which is* G, *Spout to run down Feed below;* L, *Ladder to Loft;* P P, *Posts:* S, *Space adjoining Shed.*

room. This cut feed is then placed in thin alternating layers with the pulped turnips. A car or large wheelbarrow is loaded with feed from the feed-room. and run out in front of the stalls.

The granaries are made mouse-tight. The number of bushels held by each is marked by figures on the back side of the bin, at a black perpendicular mark. Over the granary is storage.

The barn is vertically boarded, with boards a foot wide and 3-inch battens. The granaries or bins are lined with hard wood. The best way to exclude rats and mice is to pack a space with small fragments of tin—they will not work in it.

Sheep Barn at Michigan Agricultural College.

The sheep barn is 40 by 90 feet, and runs north and south. An alley 7 feet wide runs lengthwise through the centre—fig. 327. It has a good floor 2½ feet higher than the pens on each side. At each end of this alley is a sort of step-ladder to go to the hay-loft above. The joists over the

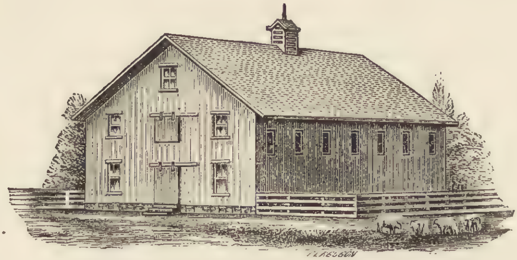


Fig. 326.—*Sheep Barn.*

alley are about 7 feet above it. At one corner of the chamber is a wool-room; and at the other a grain bin. The breadth given to the alley makes

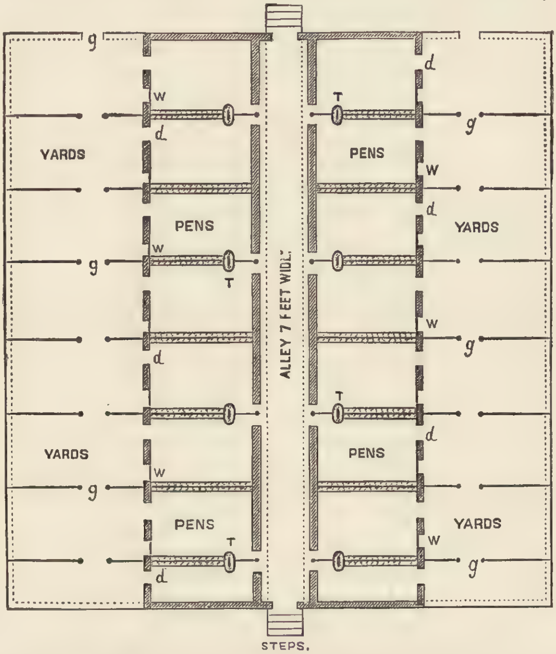


Fig. 327.—*Plan of Sheep Barn, flanked by Yards*—g g g, *Gates in Yards*; d d d, *Doors between Pens and Yards*; w w w, *Windows of Pens*; T T T, *Water Tanks.*

it convenient for feeding, and no hay gets on the sheep. In late spring this barn is found a convenient place for young calves.

The floor over the pens and alley is all on the same level. Doors are

placed in the sides of the building, opening into the loft, through which to pitch hay. The gates open for the admission of wagon and team for manure and other purposes.

Fig. 328.—*Ventilator and hinged Doors, opening downward; buttoning up when closed.*

FURTHER DETAILS.—Each pen has a low door entering from the alley; and also a door running into the adjoining pen. The sheep-rack forms the boundary of the pens. Water is supplied to each pen from a pipe below ground, and which is pumped up by a windmill at some distance from the barn. The water is kept at a uniform level by means of a valve arranged in the reservoir. The back door passing into the yard from each pen is in two parts. The lower door is set in a groove at one edge, and is held to the other with a button. When not in use it is lifted out and set one side. The upper part of the door slides back on rollers above, and is on the outside of the barn. The upper one, when closed, permits a sheep to walk under it; or the lower one may be closed, and the upper open, when occupied by lambs. The pens are 12 by 16 feet, and the yards outside and adjoining are each 12 by 25 feet. The pens may be easily varied in width by moving the sheep-rack which divides them. To assist in readily supplying feed from the alley, a slanting board or door, *a*, fig. 329, inclines towards the alley, and on this the hay or grain is placed on its way to the feeding trough below. These slanting doors are 2½ feet high, and are held in place by long hooks, *b*, at the top. In the summer these doors are set up vertically against the studs, *c*, (which form the division between the pens and alley,) and are held there by buttons.

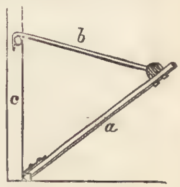


Fig. 329.—*Section of Slanting Doors.*

HORSE AND CARRIAGE BARN, BY PROF. G. T. FAIRCHILD.

Fig. 330.—*Horse and Carriage Barn.*

Three were built on the college grounds at Lansing, Mich., according to this plan, with clap-boards and plain cornice, at $300 each above the foundation, and painted two coats—fig. 330. The plans nearly explain

themselves. The first floor (fig. 331) is 8 feet between joists. The trough below the floor, at the rear of the stalls, is for liquid manure. The granary under the stairs has three bins, with lids above for receiving the feed, and at the bottom for withdrawing it. The transom windows over the stable door are made of four 9 by 12 lights.

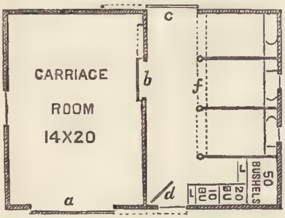
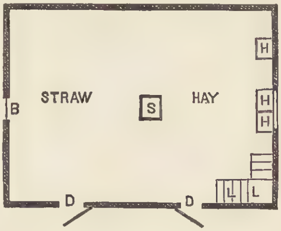


Fig. 331.—*First Floor—20 by 28 feet*—a, *Sliding Door*, 9 *feet wide*; b, *ditto*, 4 *feet wide*; c, *ditto*, 3½ *feet wide*; d, *Swing Door*, 3½ *feet*—e e. *Windows*, 1 *by* 2 *feet*; f, *Trough for Liquid Manure*; L L, *Lids to Grain Bins.*



Fig, 332.—*Loft*—B. *Blind*; W, *Windows*; H H H. *Hay Shoots, extending one foot above floor*; L L. *Stairs and Lids to Grain Bins*; S. *Shoot for Straw and Ventilator*; D D, *Doors* 3½ *feet wide.*

The second story (fig. 332) is 6 feet from joists to plates. The blind is above the girt that joins the plates. *H H H*, are heavy shoots, extending one foot above the floor. The ventilator and shoots for straw have several openings at various heights, including one at the floor for cleaning the loft.

Eastburn Reeder's Barn, New-Hope, Pa.

This plan of a barn, measuring 50 by 80 feet, including the overshoot, appears to possess many conveniences. The accompanying plans of the basement and second story nearly explain themselves. It will be seen on examining the basement plan, (fig. 333,) that the root-cellar, being next to the embankment on the north wall, and flanked by other apartments, and by stables kept warm by the occupation of cattle, will not be liable to freeze in winter. The floor over it should be double, and the space filled with chaff. It is hardly necessary to state that the bank of earth should not press directly against the stone basement wall, as freezing and thawing would tend to throw it inward; but a space of a foot or more between the wall and earth should be filled with broken stone or gravel, with a good drainage at the base. This precaution will obviate the necessity for a separate wall a few feet from the cellar wall, to support the embankment; a short bridge spanning the intervening space, over which wagons are driven into the barn.

The entire space occupied by barn and yards (fig. 333) is 80 by 105 feet. The walls for the basement should be at least 8 feet high, and the posts from 16 to 20 feet in length. The double doors to the implement rooms and to the sheds, allow the ready passage of teams. The water may be supplied from a well, or from a cistern, and by a slight descent may

be supplied to all parts of the stables, pens and yards. The amount of water obtained from the barn and two sheds, with 3 feet annual rainfall, would be about 3,500 barrels, and would supply about 10 barrels daily all the year round ; or if used only for half the year, during the driest portion, it would supply 20 barrels daily—all that the animals on the farm would

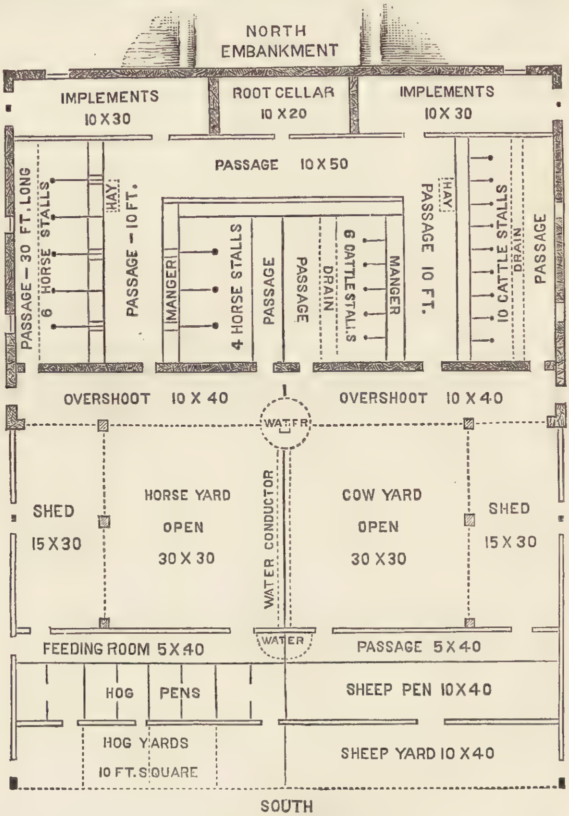


Fig 333.—*Basement*.

be likely to need. But the cistern should be quite large to hold this quantity. To contain only one-fourth the annual rainfall on the roofs, or 900 barrels, would require a cistern 20 feet in diameter and 12 feet deep, or with equal capacity in any other form. Farmers not usually appreciating the quantity of rain-water from the roofs of their buildings, do not often build their cisterns half large enough to hold it, and most of it is wasted.

The hog pens occupy a space 15 by 40 feet, which is divided into four pens, each 10 feet square, and four yards of the same dimensions. Each pen has a feeding and sleeping apartment, and will accommodate three or four hogs. The manure is thrown into the yards, and should be daily drawn or wheeled away to a compost heap, so that the air of the pens may be pure. as the animals thrive much better when perfect cleanliness is constantly maintained.

The sheep pen is 15 by 40 feet, with a yard 10 by 40 feet. It is large enough for 25 sheep. "The passage way," remarks Mr. Reeder, "in any

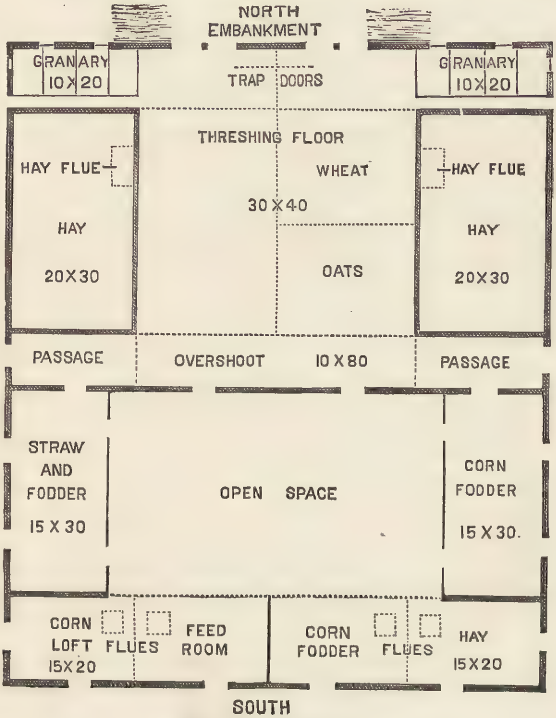


Fig. 334.—*Main Floor.*

plan which requires the feeder to go among the sheep, is objectionable." The partition separating the pen from the yard, is open slats and admits air and sun, as it opens to the south.

In the second story (fig. 334) the trap doors allow the dumping of the roots to the root cellar below. The hay flues, furnished with openings at

different heights in the hay-mows above, allow hay to fall into the 10-foot passages below, and in front of the entries. These flues should be planed smooth inside, and be a little larger downwards, to prevent the hay lodging in them. The doors outside from the granaries allow the ready filling of wagons below with the bags. The threshing floor may be filled with unthreshed grain as required—wheat on one side and oats on the other.

The straw houses (over the sheds) are 15 by 30 feet, with 10-foot posts, so that the peaks of these buildings come under the eaves of the barn. They shelter the yards from cold winds and storms, and do not prevent the sun shining in the yards from 9 o'clock in the morning till 3 o'clock in the afternoon.

Poultry houses and carriage houses are separate buildings.

James Wood's Barn.

This is a plan for a large dairy barn, 50 by 100 feet. The main floor (fig. 335) is planked all over, so as to drive loads of hay to any part of it,

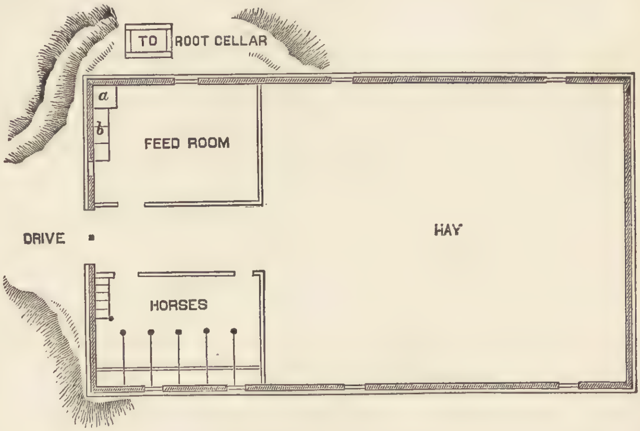


Fig. 335—*Main Floor*—50 *by* 100 *feet*—a, *Ventilating Shaft;* b, *Feed Shoots to Basement.*

or thresh grain anywhere. In putting in the hay, the loads are driven to the further end from the entrance. There the mowing is begun with a horse-fork, and placed at a convenient width, and when this is carried up sufficiently high, another width is taken, and so on until the whole is completed. On a good floor the loads may be turned or backed with ease, as may be desired. There is no "barn floor," as it is commonly termed. This arrangement has great advantages for convenience.

For feeding the animals the hay is passed to the basement through the trap doors.

The basement (fig. 336) requires little explanation. The manure cellar is under the right hand end, and the manure is passed down from the stables through the trap doors. The cistern takes the water from the whole roof,

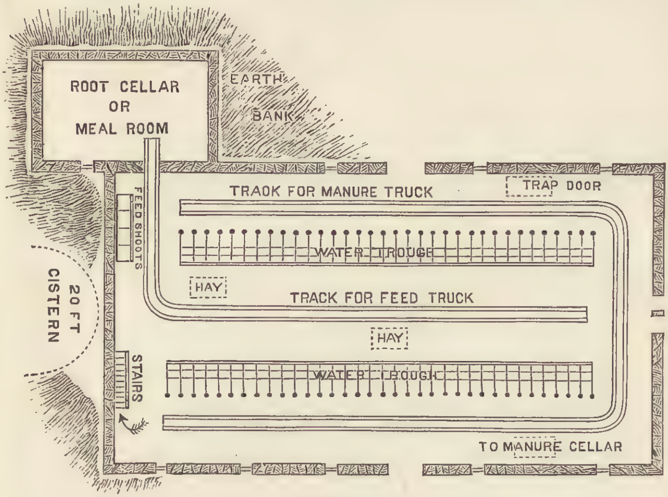


Fig. 336.—*Basement*—50 *by* 100 *feet.*

and from it pipes extend to the water troughs in front of the stalls and feed boxes. The cistern is some 20 feet in diameter, a size required to hold the water from the roof, and to supply the animals. A strong, durable timber floor, forming the floor of the entrance drive, covers it, and effectually excludes frost.

W. W. Dean's Barn.

The accompanying figures represent the leading characteristics of a barn 40 by 60 feet, with a bank on the north side, erected by W. W. Dean of Crawford County, Penn., for the accommodation of cattle, although the interior arrangements may be easily changed to a sheep barn or a grain barn, and a portion, if desired, appropriated to horses.

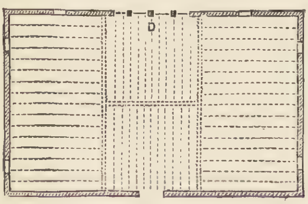


Fig. 337.—*Main Floor the dotted lines are Joists, the Floor occupying the whole Barn.*

Like the preceding design, a leading object is to omit all partitions and posts on the principal floor, so that a loaded wagon may be driven to any part when beginning to draw in hay. This floor is shown by fig. 337, the dotted lines indicating the position of the joists. The entrance doors are at *D*, and are shown in the elevation,

fig. 338. The mows are built up successively as wanted, the loaded wagon being driven to the most convenient spot for the use of the hay-fork. The large beams may be over the centre of the load, and entirely out of the way, so that there need be no pitching over them. The posts are 18 feet high, and these beams enter the posts just under the plates.

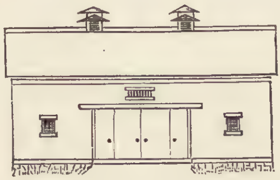


Fig. 338.—*Elevation—facing the North.*

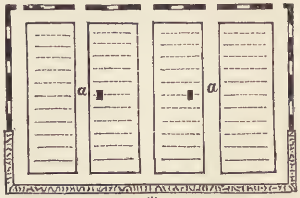


Fig. 339.—*Basement*—W, *North Wall;* a a, *Feeding Alleys.*

The basement is 9 feet high (fig. 339.) The barn faces the south, and the wall, *W*, is on the north side, from which side the loads are driven into the barn, as shown in the elevation—fig. 338. This basement is large enough for 48 cattle, the places for each stall being indicated in fig. 339; the heads of the animals may be towards the feeding alleys, *a a*, and the manure gutters and passages in their rear; or the position may be reversed and *a a*, may be the rear of the animals, as may be deemed most convenient.

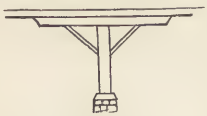


Fig. 340.

There are but two posts in the basement, the positions of which are marked in the plan. Additional strength is given to the sills which rest upon them by the timber cap, as shown in fig. 340. Similar braces to those shown are placed at right angles, to stiffen the cross-timber which receives the ends of the joists of the middle portion of the floor. The joists may be keyed for ties, as already described for Prof. Roberts' barn, to keep the sills from spreading.

There are four bents to the frame of this barn, those at the ends being made in the usual manner, and braced, as shown in fig. 341. The two middle bents are trussed as represented by fig. 342, leaving free space for the entire floor.

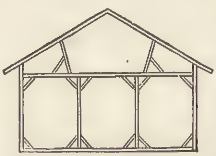


Fig. 341.—*End Bents—40 feet long; 18-foot Posts.*

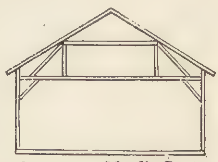


Fig. 342.—*Middle Bents—trussed.*

Mr. Dean informs us that a barn on this plan may be built with less and lighter timber than in the ordinary way, and that he finds it to possess much strength, the roof withstanding the heavy weight of snow the past winter (1877) without giving any at all, which is more than can be said of some other barns, framed in the old way.

At his suggestion the plans here given are slightly varied in some particulars from the barn as actually erected some years ago.

Octagonal Barns.

Barns of an octagonal form, or as nearly circular as will admit of easy construction, are now regarded with much favor by many intelligent agriculturists, and they possess several important advantages: 1 They enclose the greatest amount of space within a given surface of exterior wall. 2. They require fewer cross-ties or timbers, and the roof is partly self-supporting. 3. Shorter timbers may be used in building. 4. Loads may be driven to the centre and the horse-fork used to convey the contents to any side.

As but little attention comparatively has been given to plans and subdivisions of the interior or basement, it is not improbable that many improvements may yet be made. We give here, by way of illustrating the general principles of this kind of barn, the plans, with little variation, of a barn erected by E. W. Stewart of Erie County, N. Y., which he has kindly furnished, partly through another publication, with additional details especially for this article. The vignette, on page 229. which is varied from his elevation, shows the general appearance which such a barn may be made to present.

The following are the leading advantages given by Mr. Stewart, as compared with the common rectangular barn:

Our four rectangular barns covered about 7,000 square feet, while this octagon, 80 feet in diameter, encloses only 5,350 square feet, and yet has a capacity much greater than the four barns enclosing the larger area, because this has outside posts 28 feet high, while the others had only 16 to 20 foot posts. This octagon has an outside wall of 265 feet, while the other four barns had an aggregate of 716 feet of outside wall, showing the great economy of this form in expense of wall and siding. If we compare it with a single barn 50 by 108 feet, the latter will enclose the same number of square feet, and have the same capacity at the same height, but requires 51 feet more of outside wall. The rectangular barn will also require many more interior cross beams and posts, which are in the way, besides adding to the expense. The long rectangle requires, for convenience, two cross floors, which take up more room, and, being separated, are less convenient than the single floor through the centre of the octagon. The long barn requires posts and purlins to support the roof, which are obstructions in filling with hay and grain, while the octagonal roof of one-third pitch is self-supporting, resting only on the outside plates, and may be safely stretched over a diameter large enough to accommodate a farm of 1,000 acres, or say 150 feet in diameter. The plates perform the office of the bottom chord, and the hip rafters of the top chord, in a truss. The strain on the plates is an endwise pull, and if they are strong enough to stand the strain of the push at the foot of the rafters, the bottom of the

roof cannot spread, and the rafters being properly bridged from the middle to the top, cannot crush, and the whole roof must remain *rigidly* in place. Its external form being that of an octagonal cone, each side bears equally upon every other side, and it has great strength without any cross ties or beams, requiring no more material or labor than the ordinary roof. The plates are halved together at the corners, and the lips bolted together with four half-inch iron bolts (fig. 343); a brace 8 by 8 inches is fitted across the inside angle of the plate corner, with a three-fourths-inch iron bolt through each toe of the brace, and through the plate, with an iron plate along the face of the brace taking each bolt, the nut turning down upon this iron plate (fig. 344.) Now the hip rafter, 6 by 12 inches, is cut into the corner of the plate, with a shoulder striking this cross brace, the hip rafter being bolted with a three-quarter inch iron bolt through the plate into the corner post. A purlin rim, like the plate rim, of 8 by 10 inch timber, supports the intermediate rafters. If necessary in large roofs, the hips may be tied to the intermediates by long rods. The roof boards act as a strong tie to hold all together.

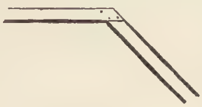


Fig. 343.

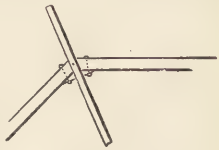


Fig. 344.

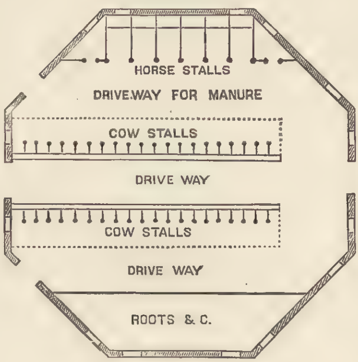


Fig. 345.

There is a drive-way 15 feet wide through the centre of the principal story from north to south (fig. 345.) There is a line of "big beams" on either side this drive-way, 13 feet high, across which a scaffold may be thrown to enable us to occupy the high space over this floor. The posts being 28 feet high, and roof rising 22 feet, the cupola floor is 50 feet above the drive-way floor below. The space above these "big beams" is quite clear of any obstruction, and a horse pitching fork may be run at pleasure to any part. The bay for hay on the left side of this floor is 80 feet long, and has an area of 2,030 square feet, and is capable of holding, when filled to the roof, 160 tons of hay. This bay, extending along the floor 80 feet, may be divided into as many parts as may be required for different qualities of hay, and each part be quite convenient for filling and taking out.

On the right hand side of the floor is a scaffold 8 feet high, having the

same area (2,030 square feet) for carriages, farm tools and machines below, and above this scaffold is—a height of 18 feet to the plates—a large space for grain, affording ample room for the separate storage of each kind, to the aggregate of 2,000 bushels or more. It will be seen that the large space in this barn is all reached and filled from one floor, saving much labor in changing from one floor to another. In our other buildings we had six places for hay, holding less than this one bay, requiring the moving of the horse-fork and tackle to six different bays, while in this bay the haying will begin and end, with room to spare.

The plans for the basement are not yet entirely perfected in all their details. The passage through it is from west to east, or at right angles to the drive-way on the floor above. The walls of the basement are not sunk below the surface of the earth, but an embankment is made on the north and south side up to the main floor, to admit ready access to the drive-way—not interfering with the passage from west to east through the basement.

One of the basement plans is shown nearly in fig. 345, and another in fig. 346. The plan shown in fig. 345, which is preferred on account of its cheapness and some conveniences, has 20 cattle stalls on each side of the 15-foot drive-way; and on each side of the horse-stalls is a triangular room for a cow with calf. On farms large enough to require it, a similar line of horse-stalls may be placed on the opposite side. It will be seen that a cart may be driven in and out at either of the three entrance doors. Fig. 346 shows the circular plan, with 52 cow-stalls, the heads towards the circular track for feeding, and the rear next the manure track. Horse-stalls may be placed near the centre, with heads outward towards the feeding track. Mr. Stewart informs us that this plan will be twice as expensive as the straight track, and on the whole less convenient. He further remarks:

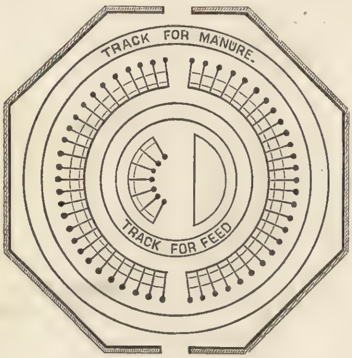


Fig. 346.

"I know some octagon barns that have a drive-way next to outside wall, but it is quite remarkable that any one should not see the great waste of room in taking off about 16 feet around the outside. Driving in a circle would require a wider floor. If you estimate the number of square feet of floor for such a drive-way, you will find about 3,900 square feet; while mine, 15 feet wide through the centre, occupies only 1,200 feet. Besides, the straight drive-way through the middle is the most convenient. And

you will see that the straight drive-way through the basement brings you in contact with the animals for feeding, and a drive-way behind for taking out manure. The basement may be laid out for four rows of animals, and leave room beside for calf-pens and lying-in stalls, &c. In that case it would require two driving or feeding floors.

"There is no doubt but the octagon is the most economical form, where the size is larger than is convenient to build with one length of timber, say 40 feet square. This form just suits the wants of all sized farms, giving capacity for 50 to 500 acres under one roof. I am extremely well pleased with it in practice. It is no small gain in economy of labor to have a self-supporting roof, and this form renders a self-supporting roof the cheapest. My barn stood some unusually strong gales of wind last fall and winter. It is, as you see, admirably adapted to stand wind and pressure of snow upon the roof. The eight sides render it out of the question for much snow to lodge on the roof, except near the plates, or where it is supported. The true circular barn is too expensive, and has really no economical points or conveniences not possessed by the octagon."

Three-Story Barns.

Before the introduction of the horse-fork, some of the best barns in the country were built three stories high, where sloping ground permitted the entrance to the upper story with a loaded wagon. Properly arranged and constructed, they still possess some important advantages, among which

Fig 347.—*Cumberland County Barn.*

is the facility with which grain may be passed from the upper story to the lower during the successive operations of threshing, cleaning and bagging. In former volumes of Rural Affairs we have given in detail these arrangements.

Southeastern Pennsylvania is remarkable for its large and excellent farm barns, many of them of stone, and three stories high—similar to those figured and described on page 96 of vol. II of Rural Affairs, and also

on page 138 of vol. III, and page 319 of vol. V, with various modifications. But we do not remember to have seen such uniformly excellent barns as are a large number in this locality. Many of them are 40 or 50 feet wide and 70 feet long, while a few measured as large as 60 by 90 feet. They

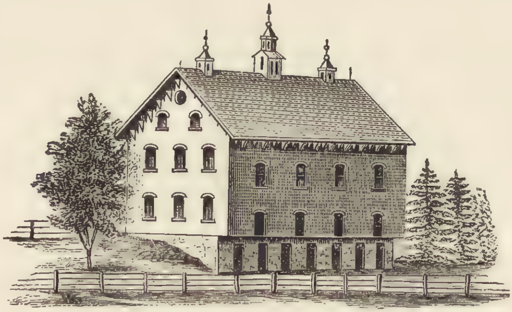


Fig. 348.—*A More Ornamental Barn.*

are variously built, of brick, stone and wood, and the best have handsomely slated roofs. They cost from $4,000 to $6,000 each, and some as much as $9,000. Fig. 347 is a representation of one of the larger ones, and fig. 348 one of more ornamental appearance.

THE FENCE FOR THE FARM.

AFTER CONSTRUCTING many miles of farm fences during a long series of years in farming, we find the kind here described the best, as combining cheapness, strength, durability and neatness. For strength it is superior to common board and rail fence, and is only equalled by the well known post-and-rail made by mortising the posts and inserting the rails. It is the most durable timber barrier we are acquainted with. Being on a straight line, it occupies but little land. It does not form so great a barrier against wind as a common board fence, and for this reason snow drifts do not accumulate under it to so great an extent. It is much cheaper in construction than either of the kinds we have named. It consists simply of good posts and common rails, which are secured to the posts with screw bolts and nuts.

We have set the posts more expeditiously and at less expense than by the common mode, by the process which we here describe. First, a long cord or garden line is stretched where the fence is to be placed. If the rails to be used are 12 feet long, a pole 11½ feet, or at least 11¼ feet long, is used for inserting pegs at each post-hole. The line is then removed, and the digging begins. But before commencing, procure a

board 6 or 7 feet long, and about a foot wide, cut as shown in fig. 349. At the middle, cut a half-circular opening large enough to receive half the post. At each end, and in a straight line with this opening, and at exactly equal distances from it, bore a hole with a small auger. Then on the other edge of the board make a small notch an inch in, and bore two other holes like the first mentioned, at equal distances from the notch, and in a straight line with it. Before beginning to dig the holes, lay this board on the ground, so that the peg (showing where the post is to stand) shall fit the small notch at the middle of the board, fig. 350. Then insert into the ground small pegs through the auger holes at the ends, which are in a line with it. Then remove the board and dig the post-holes, fig. 351. A number of holes may be dug in this way, taking care to leave undisturbed the peg on each side. The posts are then ready for setting. Fig. 351 shows the line for the fence at the dotted line, and the board, and pegs set by it at the right.

Fig. 349. *Board for Setting Posts.*

Fig. 350.

Round posts do well for this kind of fence, but any other shape may be used if they are all about the same thickness. To set them, place the

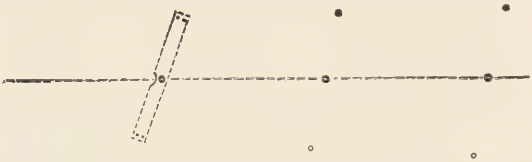


Fig. 351.—*Line of Fence and Places for Posts on it.*

board again on the two pegs, but in the holes on the other side, which are in a line with the large semi-circular opening (fig. 352). Set the post in this opening, and make it plumb, and it will be exactly where it is to stand (fig. 353). Throw in earth and pound it solid, taking care not to throw in more than an inch in depth at a time, in order that the whole may be beaten hard. When the hole is a

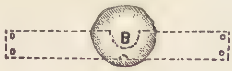


Fig. 352.

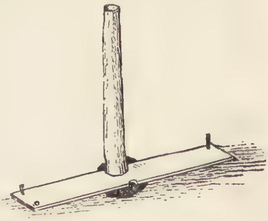


Fig. 353.—*Post Set in the Hole and Socket*

third full, the board may be laid aside and the filling completed. Posts set successively in this way, along the line previously marked out as already

described, will stand in a straight row, without the trouble of stretching lines to set them by, or of stopping to "range" each way to see if they stand in a row with the rest. As a consequence the work will go on more rapidly, they will be at uniform distances from each other, and laborers of ordinary ability will do as well as skilled workmen by the old way. We have set long lines of fence in this way with much satisfaction.

The same method may be adopted in setting flat-faced posts, in which case the central opening, instead of being semi-circular, has a flat side, as shown in fig. 354, the two auger holes being in a straight line with this face, and the board when laid on the the ground being placed carefully *in a line with the direction of the fence.*

Fig. 354.

The next thing is to screw on the rails, as shown in the completed fence in fig. 355. The screw-bolt, shown in fig. 356, is long enough to pass through the end of a rail on each side and through the post in the centre. The length will be governed somewhat by the size of the posts and rails, but as the ends of the rails are first

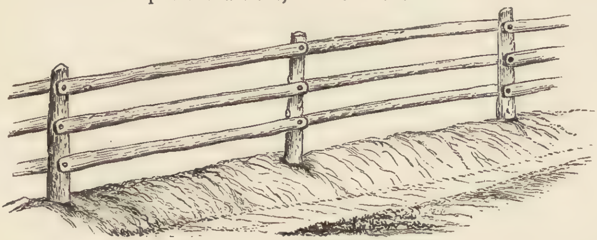


Fig. 355.—*Completed Fence.*

slightly flattened with an axe, their thickness may be partly made to correspond with the length of the bolt. We find those 10 inches long to answer a good purpose—9 inches might do well. If they are five-sixteenths of an inch in diameter, they will be strong enough, and will just fit a hole bored with an auger three-eighths of an inch. The boring is rapidly done with a brace-bit. The mode in which the

Fig. 356.
Screw Bolt.

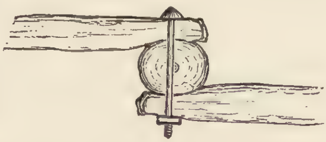


Fig. 357.—*Mode of Securing Rails.*

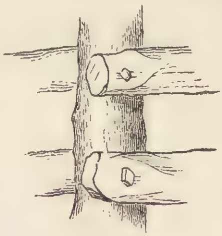


Fig. 358.
Rails Secured to Posts.

rails are placed on opposite sides of the post is shown in figs. 357 and 358.

The fence, when completed, should be about 4½ feet high, and unless small animals have the run of the farm, three rails, with a small ridge, will be sufficient. The top rail should be bolted on first, the hole being bored about 4¼ feet high. The other two may be about 14 inches apart, which will leave a space below the bottom rail of about 20 inches. Two furrows plowed against the posts on each side, and the earth then thrown up with shovels, will nearly close this opening. The bank will stiffen the posts, so that they need not be set quite so deep; the ditch will assist the drainage, and the ditch and bank will serve an important purpose by preventing horses and colts from leaning and pressing against the rails, as they do not like the uneven surface of the ground.

If the rails are cut on purpose for such a fence, they may be about 14 feet long, and thus effect a slight saving in the number of posts, in the digging, and in bolts. The bolts are bought by the hundred at about $2.50, although we have sometimes purchased them at lower figures.

The whole fence made in the best manner, will cost much less than a dollar a rod; and if farmers already have a supply of common rails, the outlay will be quite small. In durability it exceeds any other timber fence, for if the posts are of durable wood, they will last, *with good drainage*, at least thirty years, and the rails much longer. The rails cannot be thrown off by the wind nor by any animal; the fence must stand till the posts rot. It does not need the common annual inspection and repair.

Farmers who now have common crooked rail fences of good sound rails, may use them for this purpose, and extend them more than three times

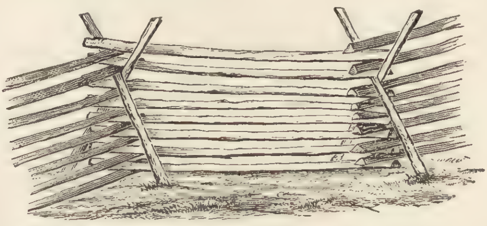


Fig 359.—*Common Crooked Fence.*

the present length, as will be seen by inspecting fig. 359, showing by contrast the great number of rails as compared with fig. 355.

In one case, where a neighbor had a large herd of unruly horses, which would demolish any common barrier, we found that a single line of the new *barbed wire*, stretched 6 inches above the top rail, was a perfect defense against them.

ROTATION OF CROPS.

THERE ARE HARD AND EASY WAYS of doing farm work, to accomplish the same end. Destroying weeds by the broad sweep of the two-horse cultivator and harrow is easier than to cut them out with the hand-hoe or to pick them with the hand. An intelligent use of the thinking powers will often enable the farmer to do better work at less expense. This remark applies with force to securing the best rotation of crops. For assisting towards this end, we give one of the most economical and profitable systems of rotation, adapted to a large portion of the grain-growing regions of the Northern and Middle States.

The order of succession in the crops is the following: 1. Inverted clover and timothy sod for corn. 2. Barley. 3. Wheat. 4. Meadow. 5. Pasture, to be continued one or more years, or changed for meadow. This is well known as the most common rotation in many of the northern States, and the only peculiarities here pointed out are in the details.

1. THE CORN.—Excellent crops are obtained, as many cultivators are aware, by applying the manure the autumn previously on the grass, or even soon after the cutting of the previous crop of hay, when corn follows meadow. But as most of the manure made on the farm accumulates during winter, it answers nearly as good a purpose to draw it out and spread it as fast as made during winter, and this course saves much labor, by making but one removal or handling of the accumulations.

2. BARLEY.—It is important that the crop be sowed early in spring, and for this reason is adapted only to dry or well drained fields. On water-soaked land it would prove a failure. If the corn has been properly cultivated and kept clean, weeds will not have gained much hold, and if

previously weedy, the good cultivation will have tended to eradicate them. This end will also be assisted by the plowing, harrowing, and other stirring of the soil in spring, in preparing for the barley. Still further aid in this direction will be rendered by passing a smoothing harrow over the barley once or more, when from a few inches to 10 or 12 inches high, and the crop will be increased by this operation. The earliest variety of barley should be sown, in order that it may be harvested early, to admit several weeks of summer-fallowing before sowing the wheat.

3. WHEAT.—This being an important crop, proper care should be given to the preparation of the soil. The good treatment of previous years for other crops will extend to this also. The effects of the rotting sod for the corn, and the manure it received, will not yet have passed away. If the barley has been cut early, at least six weeks of summer-fallowing may precede the sowing of the wheat, at a time of year when it will accomplish much towards clearing out foul matter, as well as pulverizing the soil into the best condition for the reception of the seed. If the land is not strong enough, a light dressing of manure just before sowing will be of much benefit.

4 and 5. CLOVER AND GRASS.—Clover and timothy seed are sown early in spring on the wheat, or the timothy the preceding autumn. As soon as the wheat is cut, the young clover should have a dressing of gypsum, and again another the following spring. On lands benefited by it, it is the cheapest of all fertilizers as far as it goes. The grass should be meadow the first year, as it has not become strong enough for the tread of domestic animals. If continued another year or more as meadow, it should have a light top-dressing of manure applied in autumn, as the removal of the hay tends to reduce the land. Pasture is more favorable, having also the droppings of the animals. If continued several years for meadow, a year of pasturage should be occasionally interposed, the grass never being grazed short, especially on the approach of winter. Another important requisite in connection with seeding is to sow double or triple the usual quantity of grass seed, on an even, mellow surface. The increase in the amount of the crop will repay the additional cost of the seed many times over before the sod is again plowed under.

The essential elements of the preceding rotation may be retained, with a considerable modification of the details. A portion of the field devoted to corn may be occupied with potatoes, in which case, if the sod is strong, it may be plowed for this crop the previous autumn, and re-plowed in spring. Turnips, carrots, &c., may occupy the same field, care being taken to have the land properly prepared at the same time. Instead of barley the second year, may be peas, spring wheat, or oats, in which latter case it may be necessary to give an additional dressing of manure preceding the wheat. After the field is seeded to grass, it may be kept as meadow and pasture two, three, or more years, according to circumstances, and the number of fields occupied by the rotation.

For fewer fields, and where wheat is not successful or remunerative, a shorter rotation may be employed, commencing with corn, potatoes, &c., followed by barley, oats, &c., and then timothy and clover. If the crop is oats, it should be thinly seeded, or with about half the usual quantity, which will slightly diminish the oat crop, but be of great advantage to the clover.

THOROUGH CULTURE AND KILLING WEEDS.

By J. B. Jones, Lakeview Nurseries, Rochester, N. Y.

EVERY FARMER AND HORTICULTURIST feels the necessity of killing weeds and cultivating well; yet many do not know how, and others, throngh neglect, let the weeds get such a start that they find it impossible to keep them down. Most farms have been neglected so long, and have become so seeded with weeds and quack, that it is economy to begin with a summer-fallow, which is always to be avoided if possible, and is only excusable as a starting point toward good farming. But a fallow, to be of any use, except in its mechanical effect in disintegrating the soil, must first be plowed carefully, plowed completely, inverting every furrow, and leaving no skips or balks—as early in the spring as the ground is dry enough to work well, and if any quack be discovered, should be plowed only about four inches deep, and then harrowed with a sharp fine-

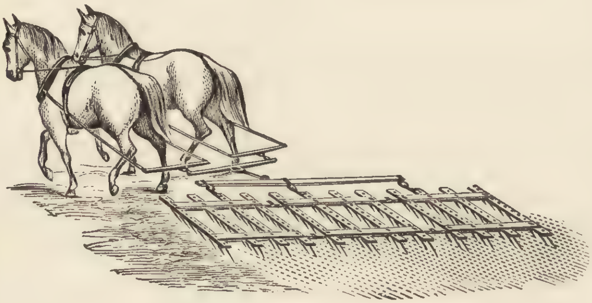


Fig. 361.—*Smoothing Harrow.*

toothed harrow until thoroughly pulverized, for which we find nothing equal to the Thomas Smoothing Harrow, made in Geneva, N. Y., (fig. 361.) After harrowing, go over the field every ten days with a two-horse wheel cultivator until July, when it should be cross-plowed, no deeper than at first plowing, and the cultivating repeated every ten days until not a spear of living quack or other foul plant is to be seen.

If it be dry land, and not a wet season, this can be done in time to sow

wheat; but if through neglect to repeat the cultivation regularly, or a wet season or damp soil should prevent killing the weeds or grass completely, continue the cultivation till winter is rapidly approaching, when plow as deep as you wish, and leave rough till spring; then sow with the expectation of having a good crop, free from weeds. We have repeatedly taken a heavy quack sod or thistle field, and so thoroughly killed every root that for years after not a plant could be seen. With such a start, followed by a heavy seeding of clover, plowed up the second year and planted to corn or potatoes, worked with a smoothing harrow until the rows can be seen, then cultivated thoroughly and carefully, nearly all hand-hoeing can be dispensed with, and the crop kept as clean as a garden. This may be succeeded by a crop of barley or oats the next spring, and plowed the moment the grain is off, cultivated until wheat is sowed, and again seeded. This will insure clean land, with very little labor, for all time, but the fence corners and roadsides must be looked after, with the determination to let *no weeds go to seed, and to kill all young ones while coming through the surface of the ground.*

Slipshod farming is never profitable, as it necessitates frequent fallowing, which is always expensive in labor, as well as exhaustive to the hand, besides the entire loss of the field for one season, with greater loss of fertility than would grow a good crop for the same time.

In these days of new inventions, and improvements on old ones, a farmer must experiment with a great number of new tools, retaining those that are desirable and rejecting those that are not; but let no one be induced by smooth-talking salesmen to sign for any tool whatever until tried and proved to be a superior article.

We have been experimenting some years with new tools, and have succeeded in supplying ourselves with several aids toward a more thorough cultivation of all hoed crops, seedlings, nursery trees, &c. In our strong clay soils we find that pulverizing the subsoil is decidedly profitable for all root crops, seedlings and trees, where grown on well drained soil; but all the plows made for that purpose were too heavy for general use until about two years ago we first used Miner's subsoil plow, manufactured by R. H. Allen & Co., New-York. This is so shaped as to enter the ground very easily, raising and pulverizing the subsoil, and yet so light as to be easily handled by a half-grown boy, and drawn by one heavy, steady horse. With this we follow the two-horse plow in fitting land for root crops and for trees, working with the two plows about 10 inches deep, and during summer keep the "Miner's subsoil" running twice in a row between the rows, when planted 3 feet apart, and once in a row among seedlings and root crops—such as beets, carrots, turnips, &c., which we usually plant 18 to 20 inches apart. This keeps the land from getting hard, as well as loosens the surface, so that weeds cannot start. There have been some objections made by observers to disturbing the roots of growing plants and trees, but our experience is that wherever so treated both plants and trees

do very much better, and we have come to the conclusion that so many roots run along the rows and downward that the plow does not hit them. What few roots are cut off soon form new rootlets, and the growth is not checked; while the deep pulverization is of great benefit the season through.

With a plow that will scour in all soils and conditions of soils, we are enabled, by planting all rows perfectly straight, to run a one-horse plow within two inches of a row of trees, throwing a light furrow away from it, and by returning on the other side of the same row, the 4 or 5 inches of soil in the row will be pushed over, leaving a sharp ridge, with no place for weeds to start (fig. 362.) We have never seen a plow, not even cast-steel, that would scour in a soft pulverized clay, except the chilled iron plows. The one we use is made at Albion, Mich., by the Gale Manufacturing Co. These plows are so hard that they do not seem to wear at all; a file will not touch them, neither will rust corrode them, and they always scour.

Fig. 362.

The two furrows thrown away from rows form a ridge in the centre, covering and destroying all weeds. After about ten days run the plow twice through the rows again, throwing the earth toward the rows, making a clean furrow in the centre, and again destroying all weeds (fig. 363.) We then follow with the subsoil plow in this centre furrow, turning the handles at an angle of about 258 towards the right hand row of trees, which will

Fig. 363.

Fig. 364.

run the point and sole of the plow as near the left hand row of trees as is advisable (fig. 364)—returning in the same way, which will tear up and loosen 15 to 18 inches of the 3½ feet between the rows, to a depth of 10 to 12 inches. Again in ten days take one of the best cultivators of the day and pass as close to the right hand row as the cultivator can be run and not scrape the trees, which will be about 2 inches if the man holding the cultivator is very careful, and keeps his mind on his work and his hands firmly grasping *both* handles. This will require him to work with the lines around the small of his back, just of the right length, so that he can check

the gait of his horse to a steady walk, or turn him to or from the row by a slight turn of the body, without letting go of the handles. Any smart, willing boy of sixteen, who is handy with horses, can be taught in half a dozen lessons of a quarter of an hour each, to do better work of this kind than an old teamster will usually do, and is far more easily taught to do as he is told. Such thorough and careful cultivation will lessen the hand labor of all hoed crops. If any weeds are left, we pull them out by hand when they get large enough; but so few are left that a boy will go over two acres per day, and not leave a weed.

We find that we can keep thoroughly cultivated and free from weeds the season through, about 20 acres per man, while under the old practice it required one man to 10 acres to do the same work in our nursery—which, in these times, is a material item.

We have adopted the same course of close culture with our farm hoed crops; but we have to start with straight rows and use Perry's Scarifier, with roller low when we stop using the smoothing harrow, and as the plants get larger, we first use the cultivator, with Miner's Subsoil alternately; then the one-horse plow, throwing a shallow furrow from the rows, finishing with the cultivator, weighted to run deep—insuring a mellow soil to the depth of 8 inches, with no more thistles or weeds that season. If the crop is potatoes, however, we finish with a winged cultivator, which we also use in the fall between the rows of our nursery trees, leaving a clean furrow between the rows for the water to run in, and the trees well protected from mice and the weather.

We find the use of the scarifier and subsoil plow in berry plantations very desirable in dry seasons, it being fully equal to mulching the surface, and prevents weeds growing; while the mulching, unless very thick, increases weeds. We only place straw close to the plants to keep the berries clean, and cultivate the rest of the space deeply. Among raspberries we work a plow, throwing the furrow alternately to and from the rows, with an occasional cultivating to break the lumps; and among blackberries we work thoroughly early in spring; then let the weeds grow, keeping them from seeding by mowing often. We find that if we cultivate our blackberries during the summer, they are more liable to be killed by the winter.

Oyster-shell Bark-Louse.—The Agriculturist furnishes the following results of an experiment in destroying this insect on the bark of the apple tree: Crude petroleum was applied in February, by means of a broom, to the trunk and branches wherever infested. In the spring the trees started with renewed vigor, and made a fine growth that season, the bark-lice having disappeared, and the bark was smooth and healthy. The work must be done in winter, and we think the oil sparingly applied. Another correspondent uses common whitewash made from fresh lime. In this case we suggest making the wash quite thin, so as not to form a thick coat of lime.

FARM BOOK-KEEPING.

By Newton Reed, Amenia Union, Duchess Co., N. Y.*

IT CANNOT be said that an exact statement of the business of the farm is essential to success, for everywhere it is evident that practical men, both the intelligent and ignorant, conduct their business with reasonable results, who cannot give an intelligent account of it in figures. They know, by years of experience, that good farming is profitable, and by well trained practical observation, they are able to decide as to the kind and method of farming which it is best for them to follow. They feel their way cautiously, all along, by trial, and without many mistakes. They are not negligent of their accounts with other people, which are readily adjusted without any detriment to either party.

And yet it is almost incredible that so few farmers are able to give, in trustworthy figures, the income and expenses of their farms, so as to show the exact profit. Men of excellent sense and long experience differ very widely in their statement of the actual value of the business of farming. If they could give the figures from a record of several years, their judgment would have a positive foundation, which would be satisfactory and valuable to themselves, and would also enable them to give to others an opinion which would carry conviction. All sensible inquirers yield to the authority of a careful record. Statistics settle questions beyond dispute.

It is some discredit to the intelligence of farmers that it is so often a question whether farming pays, and whether an investment in farm lands brings an income of three per cent. or ten per cent.

The farmer who has before him an exact record of the operations of ten or twenty years, has learned the value of his land, and has gained a wholesome confidence in his business, which makes him progressive, and sets him upon valuable improvements with energy. Such a record is a safe guide ; the maker of it consults it often himself, correcting or

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* In connection with these practical and lucid directions for keeping farm accounts, we take the liberty to insert the following extract from a private letter previously received from Mr. Reed, containing some introductory remarks:

"The first item of advice which I give to young farmers, is to keep exact accounts. But I have been disappointed in not being able to induce them all to continue the practice. They are apt to begin with the notion that it is an elaborate thing, and that it requires considerable technical knowledge and clerical skill The notion is strengthened. rather than removed. by the books which have been prepared for the use of farmers in their farm accounts. They not only propose too much. but they mix those things which must be kept entirely separated.

"Is it not remarkable that intelligent, practical and successful farmers should differ as to whether their business gives them a net of four per cent. or eight per cent.? And when the question is asked outside, whether farming pays,' very few farmers are able to settle the question instantly by the undisputed authority of figures. I know, from my own experience, that it is a simple and easy thing to keep accounts that will show the value of the business, the expenses of the household, and everything that is connected with the finances of the manager. Such a record becomes in a few years a valuable guide to the maker of it, and to those who come after him."

stimulating his work by it, and it will be very useful to those who come after him.

Those who understand the value of farm accounts are surprised at the general neglect of them by farmers. The principal reason of this neglect is from a misapprehension of the difficulties of the work. To the uninitiated, book-keeping seems like a dark science, and only suited to commercial transactions. And in our agricultural journals, which earnestly and properly insist on the importance of exact farm accounts, the plans suggested are usually too complicated, and those who enter upon them get puzzled, and give it up. The books also which are prepared for farm records are usually exposed to the same objection. They overdo. Very few of those who have attempted the use of these books continue to make a satisfactory use of them. The farmer must have a very simple book. It is scarcely necessary to say that a large proportion of farmers have not the clerical qualifications for conducting any elaborate system of book-keeping. Happily such a system is not necessary. The farmer's book-keeping may be so simple as to be beneath the criticism of the professional clerk, and yet answer its purpose completely.

The first and most important question answered by a correct farm account is, what is the profitable income of the farm? This is answered by finding the difference between the whole income and the expenses, and the simplest way to find this is the best way. It is not practicable to open an account with each particular field or crop, or with every animal or kind of stock on the farm, as some fanciful theorists have advised. The expenses of working different fields, and of feeding different kinds of stock so run into each other, that an attempt to keep a record in that way would end in confusion.

Family Expenses.—The farm expenses should be separated from the family expenses, and from all others. By not observing this rule, the widest discrepancies appear in the statement of the farmer's business. The farmer should know well what the expenses of his family are, but he should not let them be confounded with the expenses of the farm. It is this confusion of accounts which has led so many farmers to undervalue the profits of their business, and left them in inexcusable ignorance of the usual expenses of a family.*

The Income of the Farm arises from what is sold, or what is used for the family. The record of income does not take notice of all that is produced on the farm. The hay and grain fed to the stock appear in the returns of the dairy, or in the beef and pork. Grain sowed or fed is not counted in the income. But the provisions raised on the farm and used for the family—grain, meat, milk, butter, eggs, chickens, vegetables and fruit—are as much a part of the income of the farm as anything sold from it. They may constitute a principal part of the income when the farmer's

* If the members of a rural community should inform themselves of the cost of supporting a family, it would correct their notions of what is a reasonable salary for professional men.

family is large, or his farm small. There can be no true statement of the value of the farm products if these are not counted, and the exact figures which exhibit this part of the farmer's income will surprise some of the most careful observers. Besides these, any addition to the value of the stock produced on the farm is a part of the income. Also any permanent improvements produced by the ordinary labor of farm hands and teams.

THE EXPENSES OF THE FARM are labor, repairs, taxes, stock purchased, feed purchased, seed and fertilizers purchased, decrease in value of stock (if any), board of laborers, and insurance. That is all.

Insurance will probably not appear every year. *Decrease* in value of stock may not appear every year. It may be *increase* in value, and will then appear in the column of income. To ascertain this, and for other reasons, an inventory of the stock is taken at the end of the year. The board of farm laborers is clearly one of the farm expenses, and should be properly noted and separated from the account of family expenses.

Interest on the value of the farm and stock is not a part of the annual expense of the farm, but it will naturally enough be compared with the net income. Neither is the interest on any debt which may be due for the farm or stock. The salary of the manager, if he is the owner, is not a part of the expenses. His salary is in the net income.

Necessary repairs of buildings and implements is expense, but any entirely new building, in addition to what was, and any other improvements of the farm, is not expense, and if these improvements are made by the farm labor in part, so much of the cost of them must appear in the account. As it is a valuable addition to the farm, it is so much increase of capital, and so much of it therefore as appears in the account of labor may be put in the column of income, as will be shown by example. And it is proper to say that all these suggestions are from the teachings of experience, and we are at liberty to take our illustrations from actual accounts:

INCOME AND EXPENSES OF THE FARM.

Sheep sold,	$176 29	Farm labor,	$1,011.13
Wool,	116.95	Repairs.	224.38
Wheat,	513.61	Extra labor,	210.00
Corn,	5.00	Seed purchased,	73.48
Pork,	185.40	Taxes.	123.76
Beef and Cattle,	329.43	Stock purchased,	520.00
Milk,	2,656.87	Board of men,	240.00
Butter,	252.00	Plaster, fertilizer,	36.00
Veal,	53 20		
Hay sold,	68 70		$2,438.75
Wood sold,	21.00		
Apples,	35.00		
Potatoes,	60.00		
Poultry,	75.00		
Rent of tenant house,	50.00		
Improvements,	250 00		
Increase of stock,	130 00	Net income,	2,539.70
	$4,978.45		$4,978.45

This example is taken because it presents nearly all the variety of accounts. The income includes what was sold and was used in the family.

The corn raised was all fed to the stock except $5 worth used in the family. The hay and wood sold includes that to the tenant, which, with rent, is part of his wages. The permanent improvements were in conducting a spring of water to the barn, and the exact cost is put down, and not the value. The cost of it appears in the farm labor and extra labor, and and as it is not an annual expense, but a valuable investment, it must appear in the income column. If it should appear only in the expense column, it would show money out of pocket.*

Farm labor and extra labor is increased by the permanent improvements in the other column.

The repairs include farm tools, horse-shoeing, &c.

No part of family expenses is here. The board of farm-hands is a farm expense, and as it adds so much to the cost of the household, it should appear, either being deducted from the sum of the family expenses, or added to the income of the household, as if the farmer paid his wife so much, say $240, for boarding his men, which would be a handsome way of putting it.

The example given on page 265 is of the character of a ledger.

THE DAY-BOOK, or daily memorandum, out of which this ledger is posted, may be kept for the farm by itself, or the farm accounts may be kept in the same book with other accounts, where a record is made in diary form, as simple as possible, of the farm expenses and receipts, the family expenses, and any other expenses and receipts. Out of this is compiled or posted each item into its own column, the farm accounts into the farm ledger, and the others into their proper place. This method is prefered for the few accounts which a farmer has. One page of foolscap will hold all the figures of a year's account, and the posting can be done in two or three hours at the end of the year.

Sept. 3.—	Received of S—— T——, for Seed Wheat,	$15.00
4.—	Received for Calf,	7.50
	Paid for Grass Seed. 3 bush.	10.50
	J—— B——, Dr. to Seed Wheat, 12 bush., $2,	24.00
	Paid W—— S—— for Coffee, $3 50; Coat, $7,	10.50
15.—	Received for Milk (for Aug.).	195.08
	Paid S—— T——, for mending Wagon,	2.87
Dec 11.—	Beef for family, 216 lbs; 9c.,	19.34
	T—— R——, Dr. to ¼ Beef. 220 lbs.; 9c., (paid,)	19.80
	Received of J. C. & Co., for Beef,	34.60
	Received for Hide,	4.50
20.—	Paid for Cultivator & Country Gentleman,	2.00
	Paid for Evening Post (by check),	3.00
	Paid for Postage Stamps,	3.00
26.—	Paid W. & Co in full (Provisions, $17; Cloth, &c.,)	41.00
31.—	Paid Pat in full for 8 months,	160.00

This example is to show the manner of keeping the Day-Book. There are eight items of income of the farm, two for wheat, two of the dairy, four for beef. There are three items of expenses on the farm—seed, repairs and labor. There are six items of family expenses, provisions, cloth and

* These repetitions may seem to a book-keeper unnecessary, but this paper is prepared for those unacquainted with accounts.

literary—the last being for the COUNTRY GENTLEMAN, Evening Post and postage stamps.

These several items are posted, as already directed.

It is not essential that all this particular classificatfon be observed, but it is positively essential that the farm accounts and the family accounts should be separate.

In the book which serves us for these illustrations 18 pages quarto, 21 lines on a page, contain all the items which are posted into the example on page 266, and also the items of all the other business for the farm and family for a year.

It is well to have a memorandum book for the running accounts of the hired men and women, each one on a separate page, which can be balanced at a glance. This will leave the day-book relieved of many small items, and will put those accounts in a convenient form for ready adjustment, which is desirable.

By this simple arrangement the farmer will know at the end of each year what is the profit of his business, and what are all his expenses. These are the things which it is desirable to know for himself, and which he should be able to show.

There are other things of great value to the farmer and his family that come to them from the farm and its management, which are not in this exhibit, and which are indeed some of the most valuable things that a family can have, and would be costly to purchase or to hire.

The Rent of the House is worth to them as much as they would have to pay for the rent of one suitable to their circumstances.

Necessary Fuel which the farm affords is a part of the valuable income of the farm. So are the products of the garden.

Horses and Carriages, which are used for the convenience and pleasure of the family, are a part of the investment of the business, add to its cost, and are a valuable part of the farmer's profits.

All these are properly estimated by those who wish to compare the profits of the farm with the profits of other investments. There is yet another item of profit on every well conducted farm—

Increase in Productive Value.—There is, in every farm which is conducted as it should be, an increase in productiveness. It is so much addition to the capital, and the most valuable addition that can be made, the surest increase of the farmer's wealth.

Besides the day-book and its ledger-page in it (and the small memorandum), which contain all the figures of profit and loss, the observing and progressive farmer will keep a Book of Notes of various things connected with the farm and its surroundings—the weather, the progress of the season, the date of the arrival of birds, the time of doing any work on the farm, the careful details of any experiments made, the details and cost of any building or repairs, or other improvements, a record of the crops, bushels of grain raised, and tons of hay harvested, in exact figures when

practicable, and if otherwise, estimated as nearly as possible. This book is not necessary to the account of income and expense. The farmer may know his exact profits without it, but it is evident enough what a valuable record he will have in this after a few years. He may make these notes more or less extended, according to his taste, or to the leisure he may have. If he is observing and careful, he will, after a few years, have a collection of statistics of the farm which will be of positive use to every practical farmer, as well as a collection of observations which will add to general knowledge.

From this book he can show the average products of crops, and the proximate cost, the quantity of hay stored, the comparative proceeds of land in grass, and land in grain crops, the comparison between cattle and sheep, the cost of keeping cows and the income of the dairy, and most profitable branches of dairying. A compilation from these notes will enable the farmer to answer all those questions which are so often asked without any satisfactory solution, and they will help to correct a great many mistakes.

FARMING ON SHARES requires a method of its own, in keeping the accounts between the proprietor and the tenant. The book should be kept by one or the other in his own name, and not as a partnership. The pecuniary relation of the two parties sometimes becomes perplexed, and difficult to settle, when the book is kept in the name of both parties.

It is generally better that the book be kept by the tenant, who is always on the ground, and manages a greater number of sales and purchases. All his dealings with others, except the owner of the farm, are accounted in the same manner as the accounts of other farmers are kept.

There are three methods or conditions of farming on shares. First—when the owner furnishes all the stock and tools, and pays the taxes, pays for the grass seeds and commercial manures, and has two-thirds of the products of the farm. This is on the theory that one-third of the products is sufficient to pay for the labor on the farm, which is correct if the farm is a good one. Second—when the tenant owns the stock and tools, and pays for the seeds and manures and taxes, and has two-thirds of the products. Third—when half of the stock belongs to the owner, and half to the farmer, and the product is equally divided. The theory in these three conditions is, that one-third of the products of the farm pays the interest on its value; one-third pays for the labor, and one-third pays the interest on the cost of the stock and tools, the depreciation in the value of the stock and tools, and the taxes, insurance and repairs. In all the conditions the grain used for seed or for feeding is taken out of the common stock, which is the same as each party furnishing his portion of the grain. If any feed is purchased, each party pays his proportion. The farmer generally has the rent of a house, and other things, according to agreement.

The account between the parties is most conveniently kept in a book by

itself. The farmer (if he keeps the account) gives credit, or makes a charge, for every item between them, on separate pages.

1876.	James, Proprietor.	Cr.
April 1.	—Cash for Oxen, &c., (by check,)	$500.00
14.	—Cash by Brown, for Hay, 3 tons, $42, (half,)	21.00
	Calves sold to butcher, $26 do.	13.00
28.	—Calf sold to butcher, $14 do.	7.00
	Butter used in my family, 28 lbs., do.	3 50
	Butter to himself, 20 lbs., 25c., do.	2.50
		$547.00
Dec. 8.	—Beef for my family, 280 lbs., at 8c., $22.40, (half,)	$11.20
	Beef to himself, 130 lbs., $10 40 do.	5.20
	Cash for Beef sold to Brown, 200 lbs., $16, do.	8.00
	Hide sold for $3.60, do.	1.80
	Cash for Wheat sold at the mill, 160 bush , $280, do.	140.00
		$166.20

In the account book the following should face the above on the opposite page, or the opposite division of the page:

1876.	James, Proprietor.	Dr.
April 1.	—Cash paid T. Smith for Oxen, $180, (half,)	$90.00
	Cash paid for 6 cows, 300 do.	150.00
20.	—Cash paid for Bran 2 tons, 50 do.	25.00
25.	—Cash paid J. Jones by his order,	12.00
	Cash paid to himself	40.00
30.	—Cash paid Mills for Horse, $120, (half,)	60.00
	Cash freight on Horse as agreed,	3.00
	Butter to himself, 20 lbs., at 25c.,	5.00
	Cash to balance,	162.00
		$547.00
Dec. 8.	—Beef to himself, 130 lbs., at 8c.,	$10.40
20.	—Wheat put into his granary, 25 bush., $1.75,	43.75
	Cash.	100.00
31	—Cash to balance,	12.05
		$166.20

The proprietor is charged $90, his half of the $180 paid for a yoke of oxen. So of the other stock. The whole cost should be stated, and the half indicated.

April 30, the proprietor is charged $5 for 20 pounds of butter, and on the Cr. page he is credited with $2.50, which is his half. So also December 8th the beef delivered to the proprietor is charged to him, 130 pounds at 8c., $10.40. Then his half of its value is put to his credit, $5.20.

So also the proprietor has credit for one-half of the beef which the farmer puts to his own use.

By this method the account between the two parties is clear, and can be balanced at any time. At the end of April the balance due to the proprietor, who seems to furnish the capital, is $162, and at the end of Deeember, $12.05, which is paid or allowed to stand, as agreed. It is decidedly best that the balance should be found *often*—every month if the proprietor

is at hand; at least two or four times a year. It requires but a few minutes of time, and often would save endless perplexity. This is in accordance with the teaching of long experience in the books to which we have been permitted to refer.

If it is more convenient, the proprietor may keep the account, in his own name, and give to the farmer Dr. and Cr. in a similar manner, which is much better than to keep the account as of a partnership.

If all the transactions between the two parties are considered cash transactions, and each party receives his part of the income at the time in cash, or pays his part of the expenses at the time in cash, there would be no place for error. If the account is treated as such, the party who keeps the account is to pay over to the other his portion when he receives it, or otherwise he treats it as so much money borrowed, for which he gives the party credit.

It is not necessary that the young farmer should adopt at first all the parts of the system proposed here. The essential required is to find and to show the actual income of the farm; the profits of his business. If he enlarges his work, by a record of experiments made, and by notes of his observations, he will find his work not only of practical value to himself and others, but also of much pleasure.

NOTES ON ORNAMENTAL PLANTS.

A FEW RANDOM NOTES on some of the most desirable hardy ornamental plants may prove of interest to the readers of the ILLUSTRATED ANNUAL REGISTER OF RURAL AFFAIRS, and assist in their more general introduction. For the cuts accompanying these notes we are indebted to James Vick of Rochester, N. Y., so well known for his successful labors in promoting the culture of ornamental plants in this country.

There are many species of the SILENE, a few of which are highly ornamental. *S. Pennsylvanica* is a brilliant scarlet; *S. regia*, larger and richer in color; *S. armeria* (fig. 365) is an erect annual, growing a foot or more high. The flowers are in dense terminal cymes; one variety bright rosy carmine, others duller in color. It has a handsome appearance when grown in tufts or masses. The stem, like some other species, is viscid, hence the name catchfly often given to them. The two species first named are perennial; this is annual.

Fig. 365 —*S. armeria.*

THE GENUS MIMULUS.—This genus embraces a number of ornamental plants, the flowers of which are beautifully marked or variegated, (fig. 366.) There are about thirty species, found in North and South America, and in Australia. They are well adapted to baskets under verandas. They are mostly perennials.

Fig. 366.—*Mimulus.*

ASTILBE BARBATA (fig. 367), commonly known under the name of *Spiræa japonica*, is one of our handsome herbaceous perennials, bearing a profusion of white flowers, and resembling several of the Spiræas. It is remarkably successful as a house plant for winter blooming. It is becoming widely introduced into gardens.

Fig. 367.—*Astilbe barbata.*

Fig. 368.—*Perennial Phloxes.*

PERENNIAL PHLOXES (fig. 368.)—These are among the best known and most widely cultivated of our perennial ornamentals. Many varieties have been obtained by cultivation. Vick says: "The flowers, when plants get strong, are immense bunches of bloom, from the purest white to crimson. Plants will keep increasing in size, and may be divided at the roots every year or two. Half-a-dozen well established plants, and of well selected colors, are a treasure for the garden that every lover of flowers must appreciate. The Perennial Phlox is one of those hardy, useful and beautiful flowers whose culture we are anxious to increase, because the expense and trouble are but little, and the result more than satisfactory. The flower resembles that of the annual Phlox, but the clusters are large, sometimes forming majestic heads of bloom. When in flower it is two feet or more in height."

TRUMPET CREEPER, (*Bignonia radicans* of old botanists,) fig. 369, is one of the best hardy climbers, where a profuse clothing of verdure

is desired for a brick or stone building or wall. The deep orange-red flowers late in summer are a handsome ornament. The plant supports itself on the wall by rootlets from the joints. It is often seen, but is worthy of more general introduction.

Fig. 369.—*Trumpet Creeper.*

THE IRIS, (fig. 370,)—Is a well-known genus, very numerous in species, and embracing many beautiful and showy herbaceous perennials. Vick remarks: "They are natives of damp spots in all four quarters of the globe, but were adopted for garden culture more than three hundred years ago. In that time they have become very much improved, and some species and varieties are exceedingly beautiful. *I. Susiana major* is five inches across, and of the richest colors and most singular markings. The *pavonia* is small, and beautifully marked, almost looking like a butterfly. This, however, is not hardy, and is suitable for winter-flowering in the house. The others are perfectly hardy, needing scarcely ordinary care. The *I. Persica* also is admirable for winter-flowering. A few years ago, in almost every garden a clump of Iris was to be found, but being common varieties, they have been abandoned, like many of our old and meritorious flowers. It would be well now to introduce some of the improved varieties into our gardens, and we are quite sure they would afford the greatest satisfaction. The *Anglica* and *Hispanica* classes, and the *Susiana major*, are especially desirable for garden culture."

Fig. 370.—*Iris.*

THE COLCHICUM, (fig. 171,) sometimes called the Autumn Crocus, is desirable as a handsome autumn bloomer. It is bulbous, and has the singular habit of throwing up its leaves in spring, and flowers in autumn.

It is quite hardy, and may remain in the ground; or if planted in pots will bloom as a house plant at the same time as in open ground.

Fig. 371.—*Colchicum.*

Fig. 372.—*Yucca flaccida.*

Fig. 373.—*Yucca filamentosa.*

THE YUCCAS are a noble genus of showy plants, so distinct in appearance from most ornamentals that they may be made to form a special characteristic in landscape gardening where the climate will admit of the general cultivation of the more tender species. *Yucca flaccida*, shown in fig. 372, is entirely hardy at the North, where its masses of evergreen leaves are always a conspicuous object in gardens, and its tall stem of nearly white flowers in summer make it one of the most desirable ornamentals. *Yucca filamentosa* (fig. 373) is a fine species, but not quite so hardy.

GLADIOLUS is an extensive and beautiful genus of plants, some of which are hardy, and others half hardy. (Fig. 374.) *G. communis* is perfectly hardy, and when once planted, will retain its place and bloom for a long series of years with no care or attention. Among the many showy South African species, *G. gandavensis* is one of the most brilliant.

G. floribundus, *G. cardinalis* and *G. psittacinus* have been extensively used for hybridizing, and have given innumerable beautiful varieties, many of which are simple seedlings. Being tender, the bulbs require taking up for winter.

Fig. 374.—*Gladiolus.*

Floral Conveniences.

Window Brackets. — These are very convenient for the support of

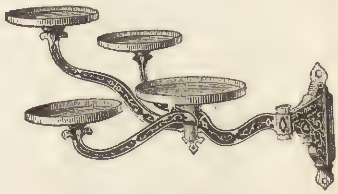

Fig. 375.

flower-pots in rooms, and being jointed, they bring the plants directly in front of the light, or they may be moved one side when desired. Fig. 375 is simple in structure, but is capable of holding four pots. Fig. 376 represents one for a single flower-pot, and is dark bronze, handsomely ornamented.

Fig. 376.

Fig. 377.—*Pot of Bulbs.*

The fine effect produced by a pot of good size, filled with various easily blooming bulbs, is shown in fig. 377.

Plant Cases.—The various modifications of the original Ward cases, for keeping house plants with little care, are well known to our floral readers. The smaller ones are most convenient when the bell-glass is adopted, as in fig. 378. For larger cases they are made to receive plates of glass, as in fig. 379. As the glass retains the moisture, they rarely

require care in watering. The plants should be slightly ventilated occasionally. Ferns are well adapted to the bell-glasses, as well as other plants. Cases obviate the inconvenience of

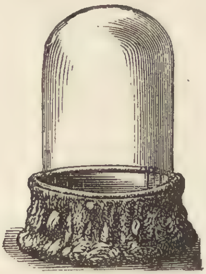

Fig. 378.

Fig. 379.

soiling carpets in watering plants. They are, of course, to be excluded from frost.

Fig. 380 represents an open case set in a window, and capable of receiving quite a number of pots, where they may always have a strong light. It has an ornamental effect not only in the room, but as seen from without.

THE FLORAL ATOMIZER, (fig. 381.)—This is a neat and convenient little instrument for forcing any liquid in fine spray over delicate plants. It

Fig. 380.

Fig. 381.—*Atomizer*.

may be used for applying whale-oil soap, and other insect repellers ; and we have found it useful for watering small seedlings in pots.

VASES ON LAWNS.—Of all the adornments of the lawn, nothing is more effective than a well filled and a well kept vase. Of course it is better to have one of a graceful form ; but almost anything will look well if adorned with healthy, and particularly, drooping plants.

USEFUL FACTS AND TABLES.

FRICTION OF ROADS.—Careful experiments show that a horse will draw a load on a level, newly-graveled road 8 times as great as the actual force applied; on a common earth road, 16 times; on a hard, smooth road, 24 times; on the best McAdam road, 50 to 60 times; on the smoothest oak plank road, 70 to 100 times; on the best railroad, 280 times as much. Thick or deep mud on a road requires a force 4 or 5 times as great as on a dry one, varying however greatly with its depth and stiffness. The diagram (fig. 382) shows the difference in some of these roads, the steepness indicating that the same power would be required to draw a load over them as up an inclined plane with a hard road.

Fig. 382.—a, *Newly Graveled Road*; b, *Hard, Smooth Road*; c, *McAdam Road*; d, *Muddy Road*.

APPLICATION OF STRENGTH.—The following table gives the results of experiments with human strength, variously applied for a short space of time, the first column of figures giving the force of the hands on the tool, and the second the force of the tool on the object:

With a Drawing Knife,	100 lbs.	100 lbs.
Large Auger,	100	about 800
Screw-driver, one hand,	84	do. 250
Bench Vice handle,	72	do. 1000
Windlass, one hand,	60	180 to 700
Hand Saw,	36	36
Brace Bit,	16	150 to 700
Button Screw, thumb and finger,	14	14 to 70

WIRE AND HEMPEN ROPE.—The British Admiralty found that a wire rope 2 inches in circumference was as strong as a hempen rope 5 inches in circumference, and either would bear 7 tons just before breaking. A wire rope 3 inches in circumference was equal to one of hemp 8 inches, and bore 13 tons. One 4 inches in circumference was equal to hemp 10 inches, and sustained 21 tons. In practice a rope should not be subjected to more than half its strength. Manilla is about half as strong as hemp.

STRENGTH OF COMMON ROPES.

		Breaking Weight.	*Borne with Safety.*
One-eighth inch	diameter,	78 lbs.	31 lbs.
One-fourth inch	do.	314	125
One-half inch	do.	1,250	500
One inch	do.	5,000	2,000
One and a fourth	do.	7,500	3,000
One and a half	do.	12,500	4,500

Varying Strength of Ropes.—A good, twisted hempen rope will support more weight before breaking if small, than when large, in proportion to its size. For example, between half an inch and an inch in diameter, it will support 8,700 pounds for each square inch of section; from one to three inches in diameter, 6,800 pounds for each square inch; if from five to seven inches, it will bear only 4,800 pounds per square inch. Multiply the square inch by the decimal 0.7854, and the product will be the strength of the round rope an inch in diameter.

Strength of Wood, Pulled Lengthwise.

Each rod was one-fourth of an inch square.

Ash, toughest, broke with	1,000 lbs.
Locust,	1,280
Elm,	837
Pitch Pine,	750
Beech and White Oak,	718
Cedar,	712
Maple and Chestnut,	656
White Pine,	550
Walnut,	487
Poplar,	437

Broken Sidewise, one inch square, one foot long.

Hickory,	270 lbs.
White Oak, seasoned,	240
Ash,	175
Chestnut,	170
Yellow Pine,	150
White Pine,	135

Pillars or Supports.—A support an inch square will bear the following weights before being crushed:

Cast-iron, best,	57 to 88 tons.
Fine Brass	81
Cast-copper,	58
Tin, cast,	8
Lead, cast,	4
Oak,	about 4
Pine,	nearly 2
Elm,	over 1
Hard Brick,	1

Slope of Heaps or Banks.—Wheat flour, falling from a spout, heaps up at a slope of 44 degrees from a level; sawdust the same; dry sand, 40 degrees; wheat, 37 degrees; gravel, 35 degrees; pulverized earth, about 37 degrees.

A Cubic Foot of cork weighs about 15 pounds; white pine, 30; coke, 32; anthracite, 53; tallow, 59; water, 62; salt water, 64; live oak, 70; loose earth or sand, 95; common soil, 124; brick, 125; clay, 135; cast-iron, 450; tin, 456; wrought iron, 486; steel, 490; brass, 538; copper, 555; lead, 709. From these figures the size of a ton load may be calculated.

Lead Balls a fourth of an inch in diameter require about 300 to a pound; half an inch in diameter, 36 balls; an inch in diameter, 4 balls.

A Cube of atmospheric air measuring 68 feet each way will weigh a ton.

Sound under water moves more than three times as fast as in air.

MELTED SNOW produces about one-eighth of its bulk of water. If closely packed, about one-fourth. The accompanying figure (fig. 383) shows the quantity of water from snow; the dotted line the height of the water from solid or packed snow.

Fig. 383.

GAS.—One and a half cubic feet of gas burning for one hour will give about as much light as a good tallow candle.

GREEN AND DRY WOOD.—Fresh green wood loses about a third of its weight in seasoning, equal to 156 gallons in every cord. The burning of one cord of green wood absorbs as much heat in evaporating this extra water, as would be sufficient to heat 780 gallons from freezing to boiling. Seven cords of dry hard wood have as much heating power as eight cords of green. The farmer who draws 50 cords of green wood on his wagon, draws over 20 tons more of water than in dry wood.

FRAUDULENT BALANCES are detected by changing the weights to opposite sides.

CONTENTS OF A BUSHEL.—A standard bushel is a measure 8 inches deep and 18½ inches inside diameter, containing 2,150 cubic inches. The heaped bushel requires 6 inches in the height of the cone above the top of the struck bushel, and contains 2,748 cubic inches in all. From these figures the farmer may calculate the contents of his granaries, and divide them into different quantities by horizontal marks, so that he may know very nearly at any time how much grain there is on hand, by observing the numbers on these marks.

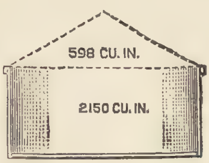

Fig. 384.—*Capacity of a Bushel.*

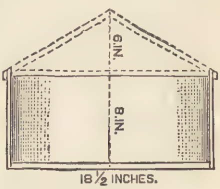

Fig. 385.—*Measure of a Bushel.*

EXPANSION OF IRON.—Cast-iron expands one-hundred-and-sixty-thousandth part one degree of heat. Wrought-iron expands a hundred-and-forty-thousandth part. An iron rail 20 feet long, on a railway, would vary in length in the greatest changes of weather, in the sun's rays, about a fourth of an inch.

AIR expands one four-hundred-and-seventy-ninth for every added degree of heat.

The weight of a *column of water* at 60° Fah., and 33 feet high, is equal to that of a column of the atmosphere having the same cross section.

HEATING POWER.—The following figures show the heating power of different substances of equal weight: Peat, 32; oak wook, seasoned, 46; oak, dried on a stove, 59; pine, seasoned, 54; anthracite, 95; alcohol, 110; olive oil, 145; tallow, 150.

Twelve pounds of fresh water have been evaporated in tubes with one pound of anthracite. In a common locomotive boiler, about 7 lbs. at 212°.

It requires 800° Fah. to render a solid body luminous by heat; in the dark, 650° or 700°; in daylight, nearly 1,000°.

A bushel of charcoal from hard wood weighs about 30 pounds.

A cubic inch of water is converted by evaporation into 1,700 cubic inches of steam.

MELTING POINTS.—Mercury melts at —39°; ice at 32°; tin, 421°; lead, 594°; zinc, 740°; silver, 1850°; brass, 1900°; gold, 1980°; copper, 2160°; cast-iron, 2700°.

FREEZING AND BOILING POINTS.—Brandy freezes at 7°; ether boils at 98°; alcohol boils at 174°; linseed oil boils at 600°; mercury boils at 630°. Iron is bright red in the dark at 750°, and at twilight, 850°; red hot by day, 1050°.

RADIATION.—Blackened tin will radiate or receive heat 8 times as fast as bright tin. Hence water in a tin boiler, over a charcoal or anthracite fire, will become heated 8 times as soon by smoking as when the tin was bright.

ALLOYS.—German silver is one part copper, one of zinc, and one of nickel. Britannia is one part tin and one of antimony, melted together, and one part of antimony and one of bismuth added. Telescope mirrors, two parts copper and one of tin. Fusible metal, melting in boiling water, three parts tin, five of lead, eight of bismuth. Pinchbeck, five parts copper and one of zinc. Bronze for medals, twelve parts copper and one of tin. Brass, two to three parts copper and one of tin.

CONDUCTORS OF ELECTRICITY.—Calling iron one, tin would be one and a half, lead and platina five-sixths, zinc and brass two, silver eight, gold four, copper six, bismuth one-sixth.

HARDNESS OF METALS is in the following order: Iron, platina, copper, silver, gold, tin, lead. The Creator has given us the strongest and most useful metal in the greatest abundance, namely iron.

SPRINGS are weakened by use, but recover by rest.

CEMENTS.—Powdered chalk added to common glue makes it stronger. Boil one ounce of glue with one gill of milk, or in that proportion, and it will resist the action of water when used. White lead paint, with over half as much iron borings, will make a cement for steam or hot water pipes. For cracks in stoves, mix borings or filings with salt water and a small quantity of sal ammoniac.

Plaster of Paris mixed with a solution of borax, rebaked, pulverized, and mixed with a solution of alum, forms *Parian marble*.

Liquid Glue is made of shellac three parts, India rubber one part, dissolved in separate vessels of ether with gentle heat; then both mixed and kept corked. It is very strong, and resists hot or cold water; thinned with ether, it renders the seams of leather water-proof.

Mucilage or Paste, that will keep months in a corked bottle without change, is made simply by adding to gum tragacanth several times its bulk

of water. Put in a moderate quantity of the gum, as it swells largely. It may be had at small cost at any drug store.

Draining Land.—An acre in a wet time contains about one thousand spare hogsheads of water. A pipe tile 2 inches in diameter, and 80 rods long, will drain a strip of land two rods wide. A descent of one foot in a hundred will carry off 250 hogsheads in 24 hours; one foot in ten, 800 hogsheads. With a pipe 3 inches in diameter the quantities carried off will be about 650 and 2,000 hogsheads respectively.

Contents of Cisterns.—For a circular cistern, and for one foot of depth, one—

Five feet in diameter will hold				4.66 barrels.
Six	do.	do.	do.	6.71 do.
Seven	do.	do.	do.	9.13 do.
Eight	do	do.	do	11.93 do.
Nine	do	do.	do.	15.10 do.
Ten	do.	do.	do.	18.65 do.

Multiply these quantities by the number of feet in depth, and the product gives the whole contents. For any larger cistern the capacity increases as the square of the diameter, and is readily calculated from the above measures.

The Quantity of Rain Water falling on roofs in a year is commonly much underestimated. Three feet of rain per annum, the average quantity, gives 72 barrels for each space of 10 feet square; a barn 30 by 60 feet yields from its roof each year 650 hogsheads of rain water, most of which is wasted.

A Leaden Bullet dropped from a balloon one mile high would be 18 seconds, or nearly a third of a minute, in falling; and the last second it would fall 560 feet, equal to 33 rods.

The water pouring over the Yosemite Falls, 1,600 feet high, is 10 seconds in falling, and during the last second its velocity is nearly 300 feet, when the stream is large.

Useful Rules.—To find the *circumference of a circle:* Multiply the diameter by 3.1416, and the product will be the circumference, (fig. 386.)

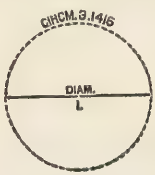

Fig. 386.

To find the *area of a circle:* Multiply the square of the diameter by the decimal .7854, and the product will be the area, (fig. 387.)

To find the *area of an ellipse:* Multiply the long diameter by the short one, and the product by the decimal .7854.

Fig. 387.

To find the *surface of a sphere or globe:* Multiply the diameter by the circumference. By this rule the earth will be found to contain about 200,000,000 square miles; and the half of the moon which we see when it is full, 6,000,000 square miles.

To find the *solid contents of a sphere or ball:* Multiply the cube of the

diameter by the decimal .5326, and the product will be the contents. By this rule the earth is found to contain 270,000,000,000 cubic miles, which to count one a second would require 10,000 years.

To find the *solid contents of a cone:* Multiply the area of the base by the height, and one-third of the product will be the content. To find the area of the circular base, multiply the square of its diameter by the decimal .7854. By this rule a Himalaya mountain averaging 5 miles high, with a base 10 miles in diameter, will be found to contain 130 cubic miles, or 520,000,000 cubic yards.

The same rule will give the contents of a square pyramid, without reducing the circle.

French Weights and Measures.

The great superiority and convenience of the French decimal system of weights and measures is leading to a frequent reference to them, and their gradual adoption. Hence the frequent inquiry for an explanation of them.

Measures of Length.

The measures of length are founded on the standard or *metre*, and hence the term *metrical* system. The metre is the ten-millionth part of a meridian extending from the equator to the pole, and is accurately determined by astronomical observation to be 39.37 English inches. The Greek numerals prefixed show the increase, and the Latin numerals prefixed show the decimal decrease, in the following table:

One Myriametre,	10.000 metres.	One Metre,	39.37 inches.
One Kilometre,	1,000 do.	One Decimetre,	0.1 metre.
One Hectometre,	100 do.	One Centimetre,	.01 do.
One Decametre,	10 do.	One Millimetre,	.001 do.

A kilometre is about five-eighths of a mile; a myriametre over six miles.

Measuring Land.

For measuring *land* the term *are* is adopted, which is a decametre squared, or 100 square metres. A *hectare*, or 100 *ares*, is equal to nearly two and a half English acres.

Measures of Capacity.

For measuring *capacity*, a decimetre is cubed, and is termed a *litre*, or about 2⅛ English wine pints.

Measures of Weight.

For *weight*, a centimetre is cubed, and applied to distilled water at 32° Fah., and is called a *gramme*, and is equal to 15.4 grains.

Milligramme	.0154	grains.
Centigramme,	.1543	do.
Decigramme,	1.543	do.
GRAMME,	15.433	do.
Decagramme,	154.331	do.
Hectogramme,	1543.31	do.—about 3½ ounces.
Kilogramme,	15433.16	do.—nearly 2¼ pounds.
Myriagramme,	154331.59	do.—over 22 pounds.

A Quintal, 10 Myriagrammes.

USEFUL MECHANICAL SUGGESTIONS.

By L. D. Snook, Yates County, N. Y.

A CHEAP LAND ROLLER.—The rolling of the ground after the crops in the spring have been sowed and harrowed is almost universally practiced, and with favorable results. Very many styles and forms of field rollers are in use, and while I do not recommend a small roller where a large one can be afforded yet rather than do without one, I would use a log roller, and construct it similar to the form shown in fig. 388, of which *A* is a log of some hard, durable and, if possible, seasoned wood, at least 2 feet in diameter, and 8 feet in length. For an axle, use at each end a round bar of iron $1\frac{1}{2}$ feet in length and $1\frac{1}{2}$ inches in diameter, firmly driven 10 inches into each end. A wooden washer, 10 inches square and 2 inches thick, is then nailed upon each end of the log, encircling the iron shaft, to prevent the end of the log from rubbing the frame. *E* is an iron brace bolted underneath the end of the frame, to which wooden box *B* is bolted; this should be hard, well seasoned wood. The seat spring *H* is bolted to the top of the tongue, and kept at an angle by wedge shaped piece *R*. The frame should be of well seasoned 3 by 5 inch stuff, set up edgewise. In fig. 389 wooden supports for end of frame are used, instead of iron brace *E*, being bolted and made in sections, as shown. Nail a piece of leather over the axle to keep the dirt out. Use soft grease; paint and keep under shelter. The total cost of a roller like this should not exceed $4.

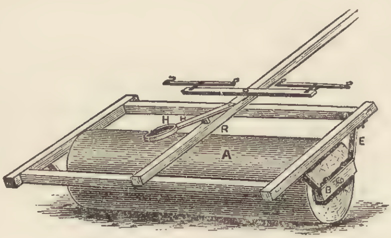

Fig. 388.

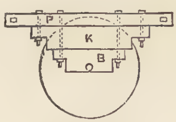

Fig. 389.

How to Mark Out a Circle without a Compass.—It is often desirable or necessary to describe a circle upon a board, paper, cloth, etc., where no compasses are at hand, and if at hand, are not of sufficient size to produce the circle required, or, as in describing circles and semi-circles upon cloth, a pencil must be made to mark instead of the point of an iron compass. In any of the above cases either of the plans illustrated will do the business. The arrangement shown in fig. 390 is the simplest, and where absolute accuracy is not required, will be found an easy method. After locating the centre of the circle, drive a small nail, or stick an awl, partly in the place, as at *E*, over which, place one end of a looped string, *B*

The other end encircles a lead-pencil, *K*, which is grasped in one hand, pressing the point of the pencil upon the article to be marked while moving it around the centre at *E*, producing the desired mark as at *A*.

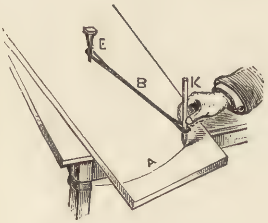

Fig. 390.

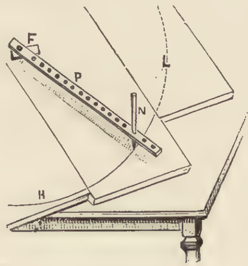

Fig 391.

The arrangement shown in fig. 391 is a little more expensive, as well as a permanent affair, and its results more accurate than the preceding method. *P* is a stick of hard wood two or more feet in length and half an inch square, one end of which is loosely attached to block *F* by a screw. Holes five-sixteenths of an inch in diameter are bored three-quarters of an inch apart, its entire length. The block *F* is placed at the centre, and kept there by pressing on the top of the screw with thumb or finger, which will allow the arm or sweep *P* to move around in a circle, and a lead-pencil *N* closely fitted into one of the holes makes the mark, as at *H*.

Carriage Steps.—No well regulated farmhouse fence should be considered complete without a carriage step at the front gate. A cheap form of step is shown in fig. 392. It is 2 feet 4 inches high, $2\frac{1}{2}$ feet wide, and $3\frac{1}{2}$ feet in length, and is provided with two steps. Two by three or 3 by 3 inch pieces are placed upright at each inside corner, to nail to. This is generally placed at the left of the gate as you enter the yard, and *always* have the latch end of the gate nearest the step, as it will be far more convenient. A cheaper form is given in fig. 393, which will answer quite as well as the former, although not quite as neat in appearance. To the top of the hitching bar *B*, connecting the two posts *A A*, is firmly nailed one end

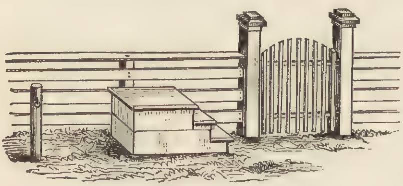

Fig. 392.

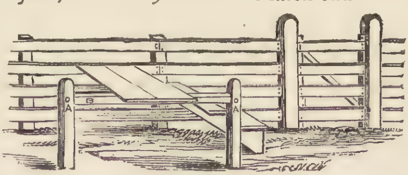

Fig. 393.

of 2 or 3-inch boards, the other end being nailed to the top of one of the boards on the fence, or to a cleat nailed parallel with bar *B*, and at the same height, if it be desired to attach it to a picket fence. Two or three steps are placed on the side toward the gate. The cost of either plan is but a few shillings, as any one handy with tools can make one in three or four hours, and it will be time well spent.

Removing Snow from Walks.—Snow is quickly removed from walks, before it becomes packed, by the use of the hand snow-scraper shown in fig. 394, the dimensions of which are: Scraper, *A*, 3 feet long, 6 inches wide, and three-quarters of an inch thick, and made from some well seasoned, light wood. The handle is 4 feet long, the end let into and firmly nailed to top of scraper, as shown. Wooden braces, *R R*, reach from the handle to within half an inch of the lower side of the scraper, at which point they are attached by screws or nails. When the snow is light, this scraper is shoved along the walk until snow falls over the top, or is moved with difficulty; then pushed into the street, or out of the way. With this plow a large surface is cleared in a few minutes.

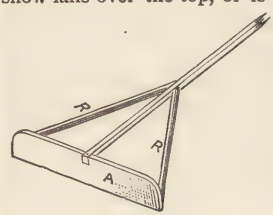

Fig. 394.

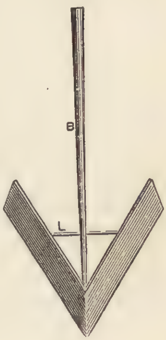

Fig. 395.

Where it is desirable simply to clear an open space about two feet wide, a sharp snow plow like the one in fig. 395 is very useful. Two boards, each $2\frac{1}{2}$ feet in length, are secured together as shown, with handle *B* nailed upon the inside, near the bottom, and projecting upward at an angle that will allow the edge of the boards to rest upon the walk with the end of the handle about $2\frac{1}{2}$ feet from the ground; it is securely retained in position by a brace, *L*, passing through the handle and upper edge of the board, to all of which it is firmly nailed. By the simple operation of pushing this arrangement in front of you along the walk, the snow is removed to both sides much faster, and with greater ease, than by the operation of shoveling.

Always up to Time.—The wide-awake farmer should make every preparation in autumn for the timely performance of work the coming season. A week of delay in the routine of work may derange it for the whole summer. Crops sowed late are reduced in amount. Weeds allowed to grow cost ten-fold to destroy. Those who have ever traveled on an express train out of time, will understand this. Every hindrance is increased ten-fold. Every local train must be waited for. Ten minutes too late is two hours loss. Provide every facility therefore in time.

ICE PONDS AND ICE GATHERING.

A CORRESPONDENT of the COUNTRY GENTLEMAN, Mr. GEORGE GEDDES, describes his mode of constructing an ice-pond, from which he readily obtains, near at hand, an abundance of pure ice, even during the warmest winters in Central New-York. The fact that formidable disease has been caused by using ice cut from ponds or streams containing impure water, should lead to great caution, and none should be used unless obtained from water pure enough for drinking purposes. For although much of the impurities held in solution are cast out in the process of freezing, the invisible germs of disease have been found to remain.

Mr. Geddes' ice-pond covers 100 square rods of ground, equal to nearly two-thirds of an acre. He finds this more than enough to supply himself and neighbors in the warmest winters. Still water in a shallow pond will freeze more rapidly than in a running stream or deep lake, and the ice will be clearer. If frozen only half a foot thick, there would be enough furnished by a single cutting from 6 square rods to fill an ice-house 10 feet square and 8 feet high, a larger amount than is required for an ordinary family. When it is remembered that the crop may be harvested several times during the winter, as it is successively taken from the surface of the water, it becomes obvious that a comparatively small pond is sufficient for common supply.

The one made by Mr. Geddes is in a small valley, and the stream which runs through it, and which is made up of springs which rise within a mile, is not interrupted by the embankment which separates the pond from the creek, and only enough water is admitted from the stream to maintain a level at a proper height. When at first the embankment extended across the valley, the water did not freeze sufficiently in open winters, and it became necessary to go several miles to another supply.

The water in the pond is about 3½ feet deep, and being drawn off when the season for gathering ice is over, the whole of the bottom and sides, except a narrow channel for drainage, is used in connection with adjoining lands for pasture. Before winter sets in, it is put in order by cutting with a scythe, removing the tufts of grass, which might injure the quality of the ice, and the bottom is flooded, to remove all light substances.

Experiments were made in cutting and handling, and the following mode adopted as the best: At the most convenient place for passing the ice over the dam, a weir was constructed a little above top-water line, about 5 feet wide. Scantling ways were made for the cakes of ice, with sides to keep them in place. They consisted of two pieces 3 by 4 inches, and 14 feet long, connected by cross-pieces, hinged on the pond side to the top of the dam, reaching out and sinking sufficiently to allow the cakes to be shoved on the scantling, and thus easily and rapidly over the top of the dam, on another scantling way, to the sleigh for drawing to the

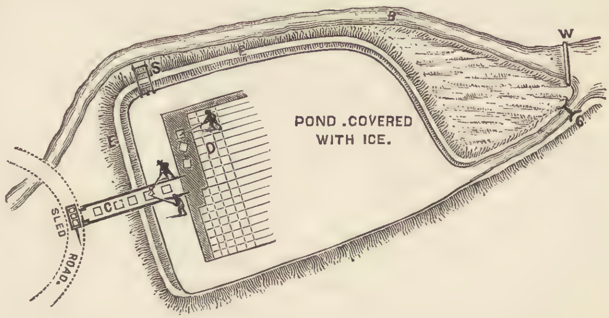

Fig. 396.—*Ice Pond—*S, *Sluice for Drawing Water out of the Pond;* W, *Waste Weir, level with the top of the Pond;* G, *Geared Gate;* E E, *Embankment:* B, *Brook;* C, *Blocks of Ice on Slideway;* D, *Blocks of Ice on Pond.*

ice-house. Two posts with a cross-piece should be set in the pond to make the slideway steady, and to keep it at the proper height, (fig. 397.)

The ice is cut with a cross-cut saw, the handle being taken from the end that goes under the water. This mode of cutting answers well in filling common family ice-houses. A channel is first

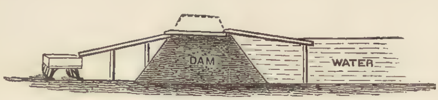

Fig. 397.

cut for the slideway, and 10 or 12 feet beyond, for the men to stand while pushing the ice with their poles (fig. 398) up the slideway; and then the surface is laid out and scratched into regular blocks for the saw. For

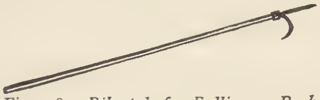

Fig. 398.—*Pike-pole for Pulling or Pushing Cakes of Ice.*

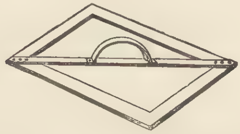

Fig. 399.—*Form for Marking Blocks of Ice.*

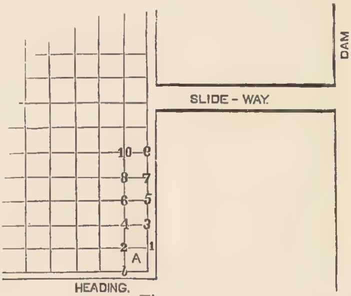

Fig. 400.

marking, four strips of boards are used, braced so as to keep square, fig. 399, after having used two long straight-edged boards to lay out a commencement, and to begin on two contiguous sides of the first cakes. This arrangement is shown in fig. 400. The saw is first used to cut from 1 to 2, then from 3 to 4, and so on across the front. Then, commencing at *b*, cut

along to 2, 4, 6, &c., which will free the first series of cakes. The axe is used to make an opening at *A* for the saw. Two men will mark and cut for two others to load. The saw should be handled with sufficient skill to keep the blocks of ice square, straight, and of uniform size.

SUGGESTIONS IN RURAL ECONOMY.

DRY GARDEN WALKS.—Gravel walks for gardens and ornamental grounds should always be free from stagnant water or much moisture. Their peculiar value depends on their being dry in all kinds of weather, when wet grass or muddy soil cannot be walked upon. Unless, therefore, the natural soil is composed of gravel or coarse sand, with a free subsoil drainage, more or less artificial provision must be made to carry off the surplus water after rains or during periods of unusual moisture. If the soil is naturally heavy, the work must be thoroughly done, by digging out the soil the width of the walk to a depth of 2 or 2½ feet. If much water is likely to flow into it, a pipe tile should be carefully placed at the bottom, as shown in fig. 401, and provision be secured for its gradual descent and the discharge of the water. In ordinary cases this tile will be hardly necessary. The bottom is to be laid with round stones, if they are easily obtained from the neighboring fields, or with broken fragments, if only to be had from builders. Each successive layer should be smaller in size, until the broad ditch is nearly filled. A coating of broken cinders may then be placed upon them, or coarse gravel, to receive the final top finish of fine gravel or coarse sand. A thorough rolling will finish top the walk.

Fig. 401.—*Cross Section of Well-Drained Walk.*

If the natural soil is gravelly, and has a natural drainage, the excavation need not be more than a foot deep, to be similarily filled, as shown in fig. 402. The surface should have a slight convexity, and as the materials will settle slightly, it may be necessary to add some time afterwards a second top finish; and for the same reason more convexity is given at first, as shown in the cuts.

Fig 402.—*Section of Walk in Dry Soil.*

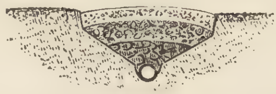

Fig. 403 —*Section in Intermediate Soil.*

In extreme cases the soil has been hard and dry enough to make a good walk when dug only a few inches, but this cannot often be relied on, and it is always best to form a stone bottom.

An intermediate amount of drainage is shown in fig. 403, which need

not have the tubular tile at the bottom, unless much water will be likely to settle in the walk.

Banking up Cellar Walls.—We marvel that any one should ever be willing to place a bank of manure against the exterior cellar walls of a dwelling, the odor as well as the appearance of which is not exceedingly attractive. Another common mode is to throw up an embankment of fresh earth, which is not much more ornamental. We have used another mode of protection, having a better appearance (fig. 404) First, rake up the fallen leaves from under the trees of the door-yard or orchard, and bank them compactly against the wall so as to form a slope about two feet thick at the bottom, and less above—varying according to the amount of protection required. Then take the trimmings from the evergreen screen, or from other evergreen trees which need shortening into shape, and place these neatly in an inverted position sloping against the leaves, cutting them just long enough for this purpose. They hold the leaves, add to the protection, and become a positive ornament instead of a disfigurement. They form a beautiful evergreen underpinning.

Fig. 404.—*Protecting House-cellars with Leaves and Evergreens.*

Improved Fences.—An important improvement is made both in the cost and efficiency of post and rail fences, by omitting one or two of the lower rails, forming a bank or ridge of earth in their place, and leaving a ditch on either side, as shown in cross section in fig. 405. These ditches and the bank prevent colts and other animals from pressing or leaning against the fences, and they thus become a more perfect barrier. It is not necessary to dig the post holes much more than half the depth otherwise required, as the banking up imparts strength and stiffness; and for the fence itself, not being so high, there is less side-strain on the posts. Fig. 406 is a cross section of the fence as commonly made, where it will be seen that a greater

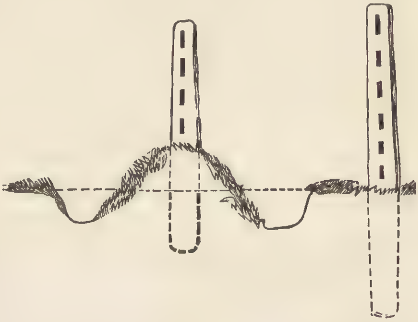
Fig. 405. Fig. 406.

depth must be given in order to secure firmness to the tall post with its six rails above. The easiest way to throw up the bank is to use the plow for this purpose, finishing with hand labor.

A very neat and good fence, occasionally seen, is built of posts and boards, the boards being 20 feet long, making each length between posts 19½ feet, after the boards are inserted, fig. 407. By this mode a great saving is effected in posts, the two smaller and intermediate ones being of refuse stuff, which may be more or less crooked, provided a straight side is laid against the boards. The boards are an inch thick, and the wider and stronger ones are placed at the top, where they are more exposed, and where greater strength is needed.

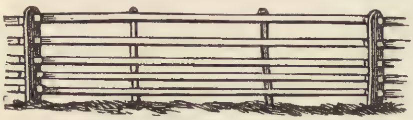

Fig. 407—*Panel of Board Fence.*

The same advantages in omitting one or two of the lower boards and banking up with earth, that we have already pointed out, would be found with a similar modification of this fence.

BARBED FENCING.—Nearly every neighborhood has some resident who is annoyed by the unruly horses of a neighbor, or by fence-breaking or leaping cattle. We have known some landowners who have expended quite a sum of money in repairing good board fences that were broken down by neighbors' rampant horses. The best remedy we have yet seen for this trouble is the new barbed wire, of which there are several different kinds manufactured and sold, and all seem to answer a good purpose. If applied to a new board fence, the wire may be stapled on in place of the top board, or rather about half the usual space for the top board may be given for the barbed wire, as shown in the cut, fig. 408. Horses and colts which have been in the practice of leaning against fences and crowding off the boards, or leaping over them, quickly learn to show great deference to a fence armed in this manner, and to maintain a respectful distance. Even idle boys' rambles are not so apt to extend across fields provided with such barriers.

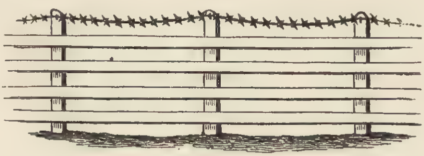

Fig. 408.

If the fence is already made, the barbed wire may be stretched from post to post, on the side opposite to that on which the boards are nailed, at or near the top. This side should, of course, be next to that from which the danger is apprehended, if practicable. Or it may be laid on the cap-board, and stapled from post to post. Old and weak board fences have been thus made strong against the passage of unruly animals.

IMPROVED HORSE-SHOE.—GEORGE GEDDES furnishes the COUNTRY

Gentleman with a description of the kind of horse-shoe which he has used for several years with great success, to prevent the balling of snow.

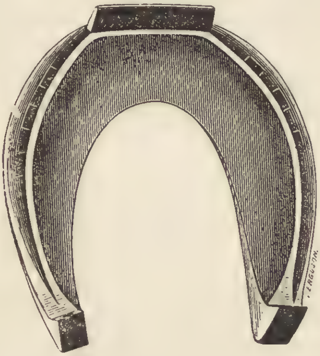

Fig. 409.

It is so made that the shoe slants to an edge on the inside so that a snow-ball cannot be held by it. The snow, in common horse-shoes, is crowded or driven into the vacancy within the shoe, and held there. The improved shoe (fig. 409) is sloped or beveled from the line of the nails to an edge on the inside; and it is so much wider at the toe, that the snow cannot be held by it. The hoof is not pared away inside to make a deep cavity between the shoe and the hoof, but only so much that it may lie nearly flat. This kind of shoe never balls, and it wears well in summer. It requires more work by the smith to make it, but this labor is many times repaid by its advantages.

Butter Worker.—M. C. Weld, in his account of Echo Farm, in the Country Gentleman, gives the following description of the butter worker employed on that farm:

The machine (fig. 410) is capable of working about thirty pounds at a time. It consists of a turn-table, in the form of an exceedingly flat truncated cone, upon which the butter lies, and which is caused to revolve by means of a crank-shaft, set in a frame, having a cog-wheel working in the gearing, seen on the inside of the turn-table. There is a conical, grooved presser, or compound paddle, which is set upon the same crank-shaft, and which revolves like a paddle-wheel, making deep depressions in the butter, through which the butter-milk runs down to the outside edge of the turn-table, where a channel collects it and discharges it into a pail set in the centre, underneath. An assistant turns the crank, while the dairy-woman watches narrowly the progress of the work,

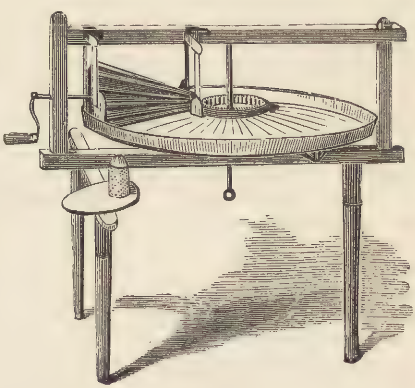

Fig. 410.

dredging in the salt and stopping the work before there is the least danger of overworking. I should say that the butter has two workings; one when it is first taken from the churn, at which time it is salted,—the other about a couple of hours afterwards. When finished, it is much freer of butter-milk than butter which ranks as of the highest grade in the New-York market.

STABLES WARMED BY CATTLE.—Tight and well built barns and stables, to be filled with cattle and horses in winter, will receive enough heat from the surface of the animals to prevent a freezing temperature inside. This is readily shown by a little calculation. Twenty large cows in a stable present about 800 square feet of surface, with a warming temperature epual to at least 50 degrees above freezing. A large stove would have about 20 square feet of surface, and when heated would average about 400 degrees above freezing. The 800 square feet of cattle surface, multiplied by 50 degrees, would give 40,000; the 20 square feet of stove, multiplied by 400 degrees, would give only 8,000—one-fifth of the former amount. If the rough iron radiates and conveys heat five times as fast as the hairy surface of the cattle, the latter would still possess as great a heating surface as the large stove. We have known large, well-built, ventilated cow stables kept warm in this way, so as never to freeze, and the sand or other absorbent daily spread in their stalls remained unfrozen till carted out when done with.

ROAD DUST.—Before wet weather sets in, every farmer should secure a few barrels of road dust from the frequented highways, for various uses during the coming year. It is good for the manufacture of hen manure, by placing the dust and the droppings in thin alternating layers in barrels, as it accumulates; and nothing is better for vaults. A barrel of the dust placed in the corner of a privy, with a long-handled pint dipper always in it, makes the arrangement better than a water-closet, if each visitor will only throw down half a dipper of the dust. It never gets out of order; never freezes up; and all odor is neutralized. Mixed with coal ashes, it is still better, and the contents of the vault are as easily removed as sand, and are a valuable manure.

FARMERS' HOMES.—It is worthy of much thought and attention on the part of farmers to throw such influences around their children as will attract them to country life. This aim should be well studied in winter, but should not be forgotten at other times. It does not require a heavy expenditure of money. Intelligent economy is better than ignorance with waste. First, the farmer's home and its surroundings should be made complete. An ornamental garden and a neatly planted dooryard should hold a prominent place in making these provisions. Workingmen's cottages will be found economical in the long run, by allowing hired men with families to board themselves—preventing confusion in homes and avoid hard work for women. Foster in young people every rural taste and rural study. Help and encourage those who like the culture of flowers.

Facilitate experiments on the farm and in the garden. Provide every assistance to those who have a taste for natural sciences. A room should be secured as a museum, where insects, dried plants, minerals, fossils and stuffed birds may be kept, and insect transformations witnessed, and where cheap philosophical and chemical apparatus may be used. Procure books to assist in all studies connected with these objects. This is the way to make intelligent and useful farmers, instead of idlers, spendthrifts and horse jockeys.

Willow Hedges.—Experiments have been made on the farm grounds at Cornell University, with a large growing species of willow for hedges. Sticks of about 4 years' growth, and about 2½ inches in diameter, are cut from trees. They are cut 4 feet long, and sharpened at one end. A deep double furrow is plowed, manure is thrown along the bottom, and then a subsoil plow is passed several times, deepening the soil and mixing the manure. The sharpened willows are then driven into the furrows, about 7 inches apart, leaving them even at the top, and about 2 feet high above ground. A strip of board or lath is then placed on the top, and a nail driven through it, into each willow stick, secures it to its place until in a year or so it is no longer needed. The smaller portion of each willow is made into smaller stakes, which are treated in the same way, but not mixed in with the larger, those of equal size being carefully assorted and placed together.

Fig. 411.—*Willow Hedge—First Year.*

The young hedges which we saw were started last spring, and the mass of shoots at the top had already grown 2 or 3 feet. It is intended to trim them up as they advance in growth, giving them height to serve as a screen against winds around the cattle yards, where it is expected that the hedge will not only be "pig-tight, horse high and bull strong," but formidable enough to stop a heavy locomotive. The willow is an imported sort, a stout grower, and readily rooting, and appeared not unlike that known as "bee willow," which would doubtless answer the same purpose.

Our readers, or some of them, will of course see objections to such hedges, and they are not claimed to be faultless, but to possess some valuable advantages.

Snow as Manure.—The remark has been often made that snow is the poor man's manure, and much stress has been laid on its value by writers of little scientific accuracy, on account of the presence of the ammonia and nitrogen which it contains. An analysis of several specimens of snow was made during the winter of 1876–7, at Union College, by F. J. Ballart and F. M. Comstock, under the supervision of Prof. Perkins, which showed that no samples of snow contained more than about a millionth part of nitrogen, and after the snow is old it contains much less. From these analyses it was

shown that only about one pound of nitrogen falls on an acre in a winter. Some European chemists, where, in thickly peopled regions, the nitrogen is rather greater, found that only seven pounds of nitrogen fell, in rain and snow, on an acre, in a whole year. This is about one-tenth of the amount required for some crops, and even if all were taken up from the soil, (which is impossible,) it would afford but a scant supply for the needs of growing plants. Hence we infer that the great benefit of rain is in *watering* the earth, and of snow in *protecting* it.

MANURE IN WINTER.—Manure may be applied to some trees and plants with much advantage in early winter. Dwarf garden trees and goosebery and currant bushes, which do not grow with sufficient vigor, may be mulched with manure, and what is not washed into the ground before spring may be then spaded in. Dwarf pear trees, which in exposed places are liable to be injured by the freezing of the soil, are benefited by the winter covering, and by the enriching of the soil. It is also well to apply a heavy coat of manure to asparagus beds, which have not yet received any. By some attention, much may be done to prevent the waste of manure as it accumulates during winter. The droppings in hen houses should be regularly swept up and deposited in stout barrels, with alternating layers of some good absorbent. Road dust is best, but if none was saved in summer, use well-sifted coal ashes. If the road dust is from clayey or loamy regions, layers of this and of the droppings, of equal thickness, will answer; but if coal ashes are employed, there should be four or five times as much. Keep stables frequently and well littered, to save the liquid portions, and wheel out the contents as often as twice a day into a well made manure or compost heap. Where an abundance of straw could not be obtained, we have seen excellent manures made by daily spreading a coating of fresh sand, from a sand hole kept open for this purpose, the stables being so warm as to prevent much freezing.

CORNSTALKS IN MANURE.—Cornstalks are largely fed to cattle, which strip off the leaves and husks only, and leave the larger stalks to be trodden under foot, making the manure so coarse and fibrous that it does not rot down in time to be spread in spring. If the owner has a tread-power, or other horse-power, by which he may drive a straw-cutter, he can cut up his stalks rapidly, and at little expense. The cattle will eat a much larger portion if thus treated, and any portion that may be left will go to the manure without giving it the coarse texture of unreduced cornstalks. Such manure may be easily spread at any time in spring, or it may be drawn out as fast as it accumulates in winter, and easily spread at once, according to the approved and successful practice now adopted by many farmers.

A GOOD HARROW.—The following description is given by NEWTON REED, in the COUNTRY GENTLEMAN: The bars (eight) are of seasoned white oak, 3 by 3 inches, and 5½ feet long, and have an entire spread of the outside teeth of 8 feet. The bars are bolted together where they meet,

(one of the pair being beveled,) except at the middle, where there is a hinge. The draft is by a bar 6½ feet long, which is coupled to the four forward points by hooks and links, and is readily removed. The teeth—40 in number—are a foot apart lineally, and make furrows 2½ inches apart; that is, there are 40 furrows in the 8 feet, which is the width of the harrow. The teeth are of ⅞-inch round Bessemer steel, and are screwed into the wood, going just through it.

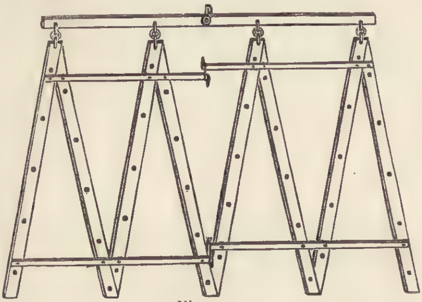

Fig 412.

It is evident that as the draft is applied to each of the four parts of the harrow, there can be but little strain on any part of it, and that when a tooth is held by a fast stone, the strain is lengthwise of the timber, instead of across it, thus having no tendency to split, as in some square harrows. This harrow is for sod land and for seeding, and cannot take the place of the Thomas smoothing harrow. It is easily constructed, and is not patented. The steel for the teeth costs in Duchess County, N. Y., $4.25. After they are worn a while, they can be turned half-way round. It makes, with the horses, only a short team, and turns round readily.

Shrinkage of Corn.—Diverse opinions are often expressed in relation to the loss in bulk and weight of corn, from husking time till the following summer or autumn. Several years ago we performed a series of experiments bearing on this subject, and reached several conclusions, which farmers generally should understand. We found the results to vary with the dryness or dampness of the autumn, and the degree of ripeness in the corn at the time of husking. The condition of the corn will vary considerably in different parts of the field, or in different ears in the same hill. It is essential, then, that a fair average be taken. The following are some of the results:

Corn in the ear, after an unusually damp season, was weighed the first of January, and by the following October had lost one-fifth part of its bulk. The weight of corn in the ear, of the northern eight-rowed variety, varied all the way from 68 to 75 pounds, to yield a shelled bushel of 60 pounds. Ears with small cobs, well dried, afforded scarcely 8 pounds of cobs to the bushel. With larger cobs, freshly husked, they may weigh 12 or 13 pounds. A moist cob is much heavier than a dry one. Farmers who sell corn in the ear should know the amount of loss from drying. As a general rule $1 per bushel for corn in the ear in summer is no better than 75 cents at husking time. Sold in the ear, it should always be weighed, not measured. We

found that a full, compact, heaped half-bushel, of moderate sized 8-rowed ears, contained 56 ears, weighing 24 pounds. Thrown in loosely, and heaped, there were only 44 ears, weighing 19 pounds. Shelled grain shrinks in bulk and loses in weight by long drying. In one case it lost one-twentieth of its bulk and one-eighth of its weight in three weeks, in a room heated with a stove. After some months, it shrank in bulk from its original condition as six is to seven, and lost weight so as to be as five is to six. Other experiments in cold rooms nearly correspond with this in results. It would therefore be better to sell shelled corn early in winter at 80 cents than the following summer at $1. With gourd seed or dent corn the results may be different, and they always vary some with seasons. Wheat loses much less by drying than corn.

Heavy Crop of Beets.—Messrs. Smith & Powell of Syracuse Nurseries have given us the measurement of a crop of beets raised in 1876 on an acre of land. The variety is known as the Yellow Ovoid. The ground was thoroughly subsoiled, and well taken care of. The crop weighed 118,400 pounds, or about 59 tons—or at 60 pounds per bushel would amount to 1,973⅓ bushels. Successful nurserymen, who know that a very deep, well prepared soil is best for trees, often furnish some of the finest specimens of profitable farming, in the heavy crops which they obtain from vacant portions of their land, which should encourage farmers to discard superficial, and adopt thorough culture.

Preventing Suckers.—It is now well known that pruning trees in winter or early spring tends to promote vigorous growth, and that pruning in summer tends to retard it. Hence the great superiority of the practice of cutting down trees in summer if we wish to avoid the growth of suckers from the stump or roots. An intelligent lady, whose grounds we have often visited, has just been trying a few experiments. A number of common locust trees were to be removed, and a part were cut off in winter, and the rest during the summer season. The latter have sent up a few feeble suckers ; the former at least *twenty times as many strong ones.* She has succeeded, however, in preventing entirely the growth of the suckers, both at the stump and at a distance from it, by placing a large quantity of common salt on the stump as soon as the tree is cut. It has proved completely effectual. If delayed until the suckers have started, it does no good.

Evergreens—Afford capital shelter from prevailing winds in winter. Plant a few, or a belt, on the side of the dwelling from which the prevailing cold winds blow. Those who cannot appreciate this ornament will find out how much fuel they save. They are still more useful, if possible, as a screen for cattle yards. There are two ways to procure them—from the nursery and from the margins of woods. The latter will suit many land-owners best, when they can obtain them within a few miles. Observe one rule, and you will not fail to make every one live, if they are not over eight or ten feet high, and grow exposed. This is to take a large

mass of earth, or muck, as the soil may be, on the roots—enough to hold them standing erect against the wind when set on the surface of the ground.

Transplanting the Oak.—When at the nursery of Thomas Meehan at Germantown, he showed us trees of different species which had been repeatedly transplanted with entire success, the last time when three inches or more in diameter. Alluding to the difficulty in transplanting the oak, he says that if removed when two years old, cutting off the tap root, and again afterwards when the roots have again run downwards, there will be no difficulty; and that he has seen hundreds transplanted when twelve feet high and three or four inches in diameter, with little or no loss. Those who admire the beauty and grandeur of oaks, should bear these facts in mind.

Quick Growing Shade Trees.—The Prairie Farmer names Cottonwood, Soft Maple and White Elm, if you want shade quickly at the expense of some other things; and Black Walnut, White Ash and Sugar Maple, if you can wait a little to get something valuable for timber.

Imitating Nature.—A late writer, in an argument against plowing orchards, says that "nature never plows, but mulches with a liberal hand." While mulching is often of great service, we cannot confine our operations to an exact imitation of nature, or we should be entirely relieved from the mandate "to dress and to keep" our kitchen and fruit gardens. Nature never grafts; never picks apples with a ladder; never builds fruit-houses; never plants trees in a row or in quincunx form; but permits the growth of pigweeds among cabbages, allows wild and domestic animals the free range of the garden, and never uses the hoe, rake, drill, cultivator, crowbar or wheelbarrow. All these artificial appliances are specially committed to us through the reason and intellect with which we are endowed, and in obedience to the command to obtain food by labor.

Poisons for Insects.—Experiments of late years show the efficiency of poisons for some insects which cannot be reached in any other way. Paris green for the potato bug is everywhere found the only efficient remedy on a large scale. Hellebore for the currant worms, if promptly applied, has always proved successful. More recently hellebore has been used to drive ants from gardens and walks. By sprinkling the powder over their holes, and working it in with a hoe, they are quickly repelled. A mixture of hellebore and flour appears also to have been successful against cucumber bugs and some other insects. Paris green has been used on the canker worm after it has got possession of the trees, by throwing it on mixed with water, by means of a hand engine, early in the season, before there is danger of poisoning the fruit.

Lime Dust.—The following has been recommended as the best mode for preparing lime dust for slugs and other insects, for mildew, &c.: Take say a peck of fresh or sharp lime, broken up into small pieces; then add four pounds of flour of sulphur, or in like proportions if in smaller quantity.

Add one-third as much boiling water, or just enough to slake the lime to dry powder, and cover the vessel as soon as the water is poured on. By adding water it may be made into an excellent whitewash for trees, the sulphur increasing its efficacy.

GATHERING AND STORING TURNIPS.—The long varieties can be quickly gathered by pulling them with both hands, striking them together to knock off the dirt, and laying them *on the row with their crowns in a straight line;* then with a straight edged stalk-knife, the tops can be struck off with great rapidity. I think one man will do as much as two will in any other way that I know of. Select a sloping or dry piece of ground, and gather them into one long heap; cover them with straw to keep out the dirt, and pack the earth on them a foot thick; do not put any soil on the very top, but cover that with a board with holes in it, or old fence posts with the buts off. The holes in the boards or posts will give ventilation, and should be covered with a board to keep out the wet. Should the weather be very severe, long stable manure put on the north side of the heap will keep the frost from going in too deeply. Grade around the heap nicely, so that no water will stand there. Turnips keep better this way than in a cellar, and by using some manure on the heap, can be got with ease at any time.—J. G. W., in COUNTRY GENTLEMAN.

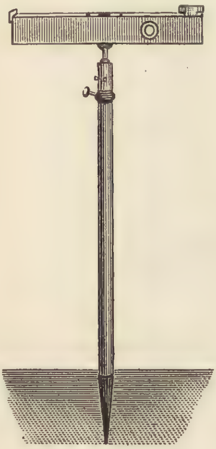
Fig 413.—*Draining Level.*

DRAINING LEVEL.—Mine is a carpenter's level with sights, aud a hole in the bottom to fit the stem of a surveyor's compass staff; a set screw on the side of the staff wonld be almost as convenient. With this level and a rodman I lay off hillside ditches to prevent hilly land in cultivation from washing; drain low land; dig cellars; lay the foundation for houses, and set gate posts. It is also convenient and useful to measure the "cut and fill" in grading roads, and in short for any use on the farm requiring a level or perpendicular. I could not get along without it. The accompanying cut, fig. 413, describes it sufficiently.—A. R. DAVIS, in COUNTRY GENTLEMAN.

POTATO BUGS.—Some curious statements were made in relation to these insects at the Rochester Farmers' Club. Several members said the potato bugs would enter the ground and eat the tubers which were near the surface, after the tops were all devoured. Mr. Crum could not kill them with water nearly boiling; nor could he drown them. Mr. Pierce said they were ten per cent. stronger than Spanish flies, and also that they will fight among themselves with the fierceness and persistence of bulldogs.

A CHEAP REFRIGERATOR.—An inner box is made of yellow pine,

worked 4 inches wide, 1 inch thick, tongued and grooved; 7 feet long, 4 feet high, and 3 feet wide, with two doors in front, and an opening on top for ice-chamber, which is 3 feet by 5 feet 6 inches, and 3 feet high, with two doors in front. Outside of each is the main box, and ice-chamber on top. I put an outer box 4 inches distant all around from inner box, and

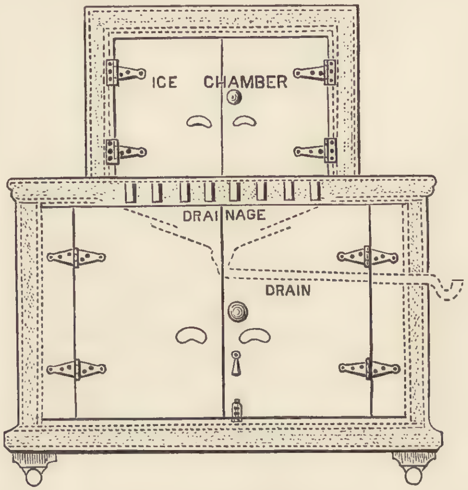

Fig. 414.—*Cheap Refrigerator.*

fill this space between the two with cork shavings, well rammed in. These are a better non-conductor than charcoal, sawdust or any other known material. It is painted inside and out with Prince's metallic paint, two coats, and then lined throughout the inside with zinc, above and below. On the bottom of the main chamber I put a marble slab the whole size of the same. It is very cold. In the ice-chamber put cross-bars near each other to hold the weight of ice, and under them put zinc-covered boards (to run the water into a gutter to be carried outside into a pail), on an incline, leaving an opening from the ice above to the chamber below, thus cooling the contents thereof. All the doors must be filled with cork in the same way as the sides. Use wrought-iron hinges, and have no ventilation. Put slats inside to suit your conveniences of milk, meats, &c. In the refrigerators made by Mr. Lesley, the ice is put in usually about once in each week, and it oftentimes lasts two weeks. The same principle has been applied to storehouses, and country produce, in quantities as received from the cars, is put in until sold.—Correspondent COUNTRY GENTLEMAN.

RENDERING POSTS DURABLE.—As a general rule, we prefer soaking with petroleum wooden structures above ground, and applying hot gas tar

to wood which goes below the surface. The petroleum soaks well into the pores, and gives the wood the character of cedar; but long continued contact with the moisture of the soil tends to abstract or dissipate a part. Gas tar cautiously heated and applied to wood (the best way is to immerse the wood in a kettle of tar), remains mostly at the surface and forms an impervious coating. The most perfect preparation, doubtless, would be to get all the petroleum into the pores of the wood first, and then coat with the tar.

CIDER VINEGAR.—The following is the mode adopted by some who have large orchards, one of whom assured us that his apples were worth three dollars per barrel for this purpose, as he uses only those of fine quality and good flavor: The cider is kept through winter till spring, when the process commences. A supply of the best vinegar in barrels or hogsheads is already on hand as a beginning. These have been kept about half full for many years. About two gallons of the fermented cider are added to each barrel at a time, and in a few days two gallons of the vinegar are withdrawn. The bung is always open, and the cider thoroughly stirred with the vinegar when added. A regular weekly supply of the strongest vinegar is thus obtained through the season. The easiest way is to pump the cider from the cellar below to the vinegar loft above, through a hose pipe. If too much cider is added at a time, it checks the process. We have tried this mode on a small scale with entire success.

PRESERVING TIMBER.—The sleepers or ties of railroads are more exposed to decay than timber in any other position. Their durability is greatly increased, however, by embedding them in gravel with perfect drainage. They will last from twice to three times as long thus protected This shows the importance of providing drainage for fence posts, the portion of which at the surface is nearly as much exposed to decay as railroad sleepers. It appears from observations made in Germany, that after 12 years' service with oak sleepers, it was found necessary to renew three-fourths. When treated with chloride of zinc, less than four per cent. needed renewal in 7 years; impregnated with crude creosote, only one in ten thousand had decayed in 6 years. A correspondent of the Garden has used creosote on his gates and fences with great success; after 6 years all the treated wood is perfectly sound and free from moss or fungus; the untreated portions have already begun to decay, and are covered with moss and lichens. He finds it important to season the wood thoroughly before it is immersed in the tank.

GARDEN USE OF FERTILIZERS.—PETER HENDERSON urges the importance of pulverizing finely and mixing thoroughly with absorbents, all concentrated manures, in order to obtain the best effects. He recommends adding to every bushel of the fertilizer three bushels of leaf mould, pulverized muck, &c., or in their absence common garden soil—the material to be as dry as it can be made. Road dust would be still better.

THE MANAGEMENT OF POULTRY.

Artificial Chicken Raising.

THE FOLLOWING ACCOUNT of the mode used in France has been furnished by Dr. D. E. Salmon, and may interest many of our poultry-raising readers :

Their construction and operation are so simple that I believe almost any one of ordinary ingenuity can make and use them successfully. Fig. 415 represents the incubator, with the drawer containing the eggs partly drawn out. Fig. 416 shows a section of the same. The upper part of the box

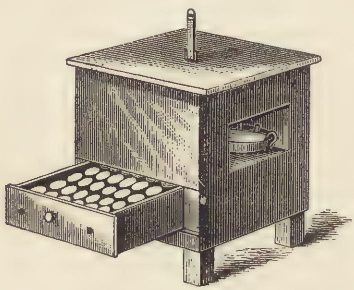

Fig. 415.

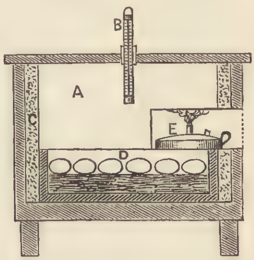

Fig. 416 —A, *Zinc Case for Water ;* B. *Thermometer ;* C, *Non-conducting Filling ;* D, *Drawer, with Eggs ;* E, *Lamp.*

contains a zinc reservoir, with a space left, as shown in the drawing, for the introduction of the lamp, and a small tube passing through the top of the box, which serves for filling it with water, and also for holding a thermometer, which, plunged into the water below, indicates the temperature. Thermometer tubes may be obtained, and held in position continually, by inserting through a perforated cork of the proper size ; the temperature of the water may be seen at a glance. The drawer for the eggs is immediately beneath the reservoir ; it is provided with two small holes for ventilation, and holds about forty eggs. A small thermometer is also kept in the drawer to indicate the temperature of the air surrounding the eggs. A space is left around the reservoir, and on three sides of the drawer for a filling of sawdust or other non-conducting material. A flat tin lamp, with two round wicks, is used by the inventor, but I see no reason why one properly constructed kerosene burner would not answer the purpose. A little soft hay is spread in the bottom of the drawer ; the eggs are put in ; it is then closed and warmed by the water above. The temperature of the water is kept at 122°, or enough higher or lower to keep the eggs at 104° to 106°. Once or twice each day the drawer is opened, and the eggs turned and left for a quarter of an hour in the open

air before replacing. At the end of 21 days the chickens come out of the shell without assistance, and are left 24 hours in the drawers, without feed, before being taken to the artificial mother. This operation follows the natural method exactly; the eggs receive their heat from above; they are turned each day, and are ventilated, as is the case when under the mother. The holes for ventilation in the drawer are very small, and probably could be dispensed with without inconvenience, as few will make the drawer fit air-tight.

The artificial mother represented in figs. 417 and 418, is also provided with a zinc reservoir of the shape shown in fig. 418; it is covered below with lamb's skin, in the warm wool of which the chickens nestle and warm themselves. This reservoir is only filled in cold weather, and then only once a day, the water being first heated to a temperature of 169° to 175°. The tube passing up from this reservoir is used for filling, and the one at the side for emptying. The top of the box is of glass, arranged to slide so as to open at pleasure; there are three ventilating holes on each, side, and a gate at the end. The chickens are placed in this when 24 hours old, and kept there for a week; they are then gradually habituated to the outside air—the gate being constantly open for them to enter at will. Fresh water and feed are given five times each day, it being considered essential to give only small rations, and to repeat them frequently.

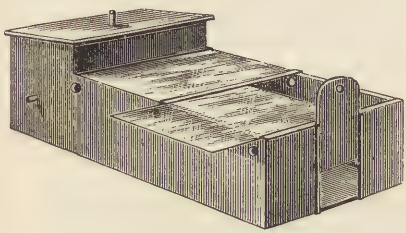

Fig 417

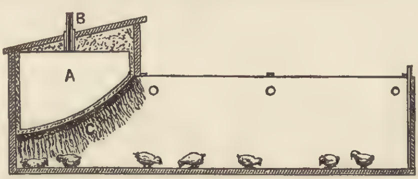

Fig. 418.—A, *Zinc Case for Water*; B, *Tube for Filling*; C, *Lamb's Skin*.

This method of hatching and rearing chickens, which follows nature so closely, is used to a considerable extent in France, and is evidently satisfactory. Its economy in this country depends almost entirely on location. With oil at 13c. to 15c. per gallon, eggs could probably be hatched for about one cent each. There is no trouble with hens leaving their nests, or losing their chickens with poor care; and with the non-sitting breeds the eggs laid during the period of incubation would pay double the cost of hatching a sitting. This of course only applies where eggs are worth 1½c. or 2c. each, and a considerable number of chickens are raised. There can be no doubt that in such cases artificial hatching and rearing would pay well if properly conducted. The method of hatching by means of

fermenting horse manure, advocated by Prof. Corbett, I have never seen in operation, but for very large establishments the plan, or some modification of it, might be found advantageous. On a smaller scale, however, and for all who wish for any reason to hatch artificially with little trouble or expense, I have never seen anything that would compare with the apparatus just described. For hatching high-priced eggs, such as are frequently sold at from 30 to 50 cents each, it would almost invariably pay.

Self-Feeding Hoppers.

The simplest way is to make a box large enough to hold the desired amount of grain, with one side open at the bottom, and having a trough below and in front of the opening, into which the grain will run as fast as it is eaten out by the fowls. Fig. 419 shows this arrangement, with the addition of a false bottom to the box, put in slanting downwards to the front, so that all the grain in the box may be used before it is necessary to replenish it. To prevent the fowls from scratching the grain out from the trough, narrow strips or slats should be nailed across, far enough apart so that the fowls can easily reach the grain, but so near to each other that the hens cannot get in and scratch. The box can be made with a trough on each side, instead of a single one as in the cut.

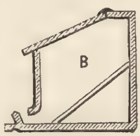

Fig. 419.

In fig. 420 is given a modification of this box, having a cover over the feeding trough to keep out rats, squirrels and mice. There is a cord

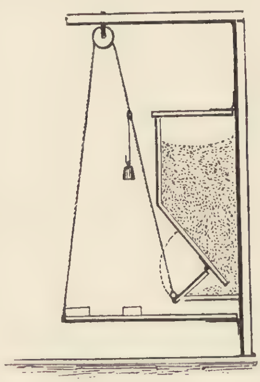

Fig. 420.

Fig. 421.

fastened to the lower edge of the cover, and passing over a pulley above, is carried down and fastened to the edge of the hinged platform in front of the feeding trough. A weight is attached to this cord, or the cover is made sufficiently heavy, so that it remains closed, except when a fowl steps

upon the hinged platform. When this occurs the platform falls, and the cover is raised from the trough, permitting the hen to eat what she wants. This is clearly shown in fig. 421. The weights can easily be graduated to the size of fowls kept, and the arrangement is so simple that it always works well.

HEN-HOUSE.—The following description of a good hennery is given in the COUNTRY GENTLEMAN by C. L. BAKER of Fayette County, Pa.:

The building is 22 feet long, 8 feet wide, and two stories high. It has a cross partition above and below, making two rooms above and two below, each 8 by 11 feet. The front end, shown in the cut (fig. 422), faces the south. The lower story is mostly sunk below the surface of the ground on the upper side. The north portion has two doors —one at each side near the end, for the lower story, and one at the

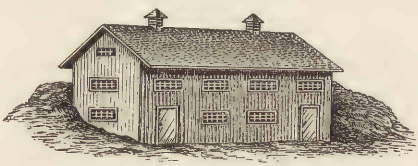

Fig. 422.—*View of Hen-House.*

end for the upper story. The south portion has a door at the side, near the end, from which stairs lead to the upper story. The windows, shown in the view, are 25 by 45 inches, and contain 7 by 9 glass. In the lower story the windows are 20 by 45 inches, and filled with 6 by 8 glass. They are placed between the stringers, and are made to slide. There are no windows on the west side, where the higher ground, nearly reaching to the top of the lower story, gives warm quarters in winter. The upper story is for roosts. The partitions will keep two breeds separate. A stream of water passes through the yards, which is very essential to success in keeping fowls. The yards should be 3 by 6 rods, if you have room.

PREVENTION OF VERMIN ON FOWLS.—A successful poulterer gives the following as sure to prevent loss by gapes or other disease induced by parasitic vermin: Take four ounces of lard and melt in an earthen vessel; add to this half a teaspoonful of common carbolic acid, stirring until cold. When a brood is ready to leave the nest, grease the hen with this mixture, under the wings, between the thighs, and around the vent; also, with the finger, rub a small portion on the top of the head, and along the throat of the chicks, being careful that none gets in the eyes. Carbolic acid mixed with air slaked lime makes a splendid powder for dusting the floor and crevices of the house, destroying vermin and all noxious odors.

For scaly-leg, use half a pint each of common fish oil and kerosene; half an ounce of sulphur and a small quantity of carbolic acid, mixed together. Apply with a small brush twice, allowing two days to intervene between applications.

NOTES IN FRUIT CULTURE.

The Season for Pruning.

IT IS NOW ADMITTED by all who have given attention to the subject, and it is in accordance with both theory and practice, that to favor a free growth of the shoots and leaves, pruning should be performed while trees are dormant or leafless. On the other hand, to check growth, and to promote fruitfulness, the pruning should be done on the tree in leaf and growing. We know of no cultivators who dissent from these truths. It is commonly admitted also that summer pruning favors a more speedy healing of the wounds.

Each season, therefore, has its peculiar advantages. Unless the trees have superabundant vigor, the pruning should not be done after the buds begin to swell. Winter may be better than early spring for hardy trees, by allowing the freshly cut faces to dry and close the sap pores before the commencement of growth. But as cutting away branches always makes trees more susceptible to the effects of cold, the work should not not be performed much before spring on half-tender trees. Pruned at this season of the year, they are not checked in growth, as when the work is done in summer, when the tree must lose a portion of its leaves, and become thus suddenly checked in the performance of its functions.

Pruning in summer, or while the trees are in leaf and growing, may be practiced if they are in vigorous condition, and but a small portion is cut away at a time. There can be no harm at any season in removing a single misplaced shoot. A better way is to rub off needless shoots as they are starting, or to pinch off the ends to prevent extending, as this is not attended with a great loss of leaves. If trees grow too fast to bear, a general pinching over the head, or a summer thinning of the shoots of the whole tree, will tend to induce fruitfulness the second year.

As we have already stated, summer pruning usually favors the more speedy healing of the wounds where limbs of much size are cut off. But experiments do not prove that pruning at this season is always best for the tree. We know of only a single series of trials reported for determining this question, and which were published in 1876 in the Country Gentleman. James Redpath of Iowa cut off a branch from an apple tree in every month of the year, and at the end of five years, when all had healed over, the wood was found least decayed, on cutting into the tree, in those pruned in February and March, and most in those cut in June and July—the latter having healed entirely over one year the soonest. In another similar experiment, all were healed over in four years, with a similar result. The decay from the summer pruning was about three times as great as in winter.

The reason of this increased decay from summer pruning, may perhaps be understood by observing the condition of the wood in both cases. After the leaves, (which continue to pump the sap from the tree as long as they remain) have fallen in autumn, the roots gradually absorb moisture from the soil, and fill the tree with it during winter, causing its copious discharge on the approach of warm weather from such trees as the birch, sugar maple, and other trees, and from grapevines, and a less flow from other trees. If the pruning is done before this discharge commences, so that the sap pores may be closed by drying, the force of the sap will be directed to the remaining branches and buds, without check or derangement. But if the sap current is first allowed to set towards the leaves in branches already growing, the sudden check by amputation deranges the watery currents, and disorder and disease follow so far as the wood is affected, while the flow expends itself in a more speedy formation of wood at the exterior of the wound.

This result suggests a third mode of pruning, a combination of the two already described, and which has been practiced by some cultivators. This is to cut off the limbs intended to be amputated, leaving stumps several inches long, performing the work in winter or before the buds swell, (as shown by the dotted line *a a* in fig. 423,) and then in summer cutting off this stump close to the tree or larger branch, as at *b b*. The object of this mode is to get the full benefit of winter pruning, by avoiding the check of growth produced by heavy summer lopping, and at the same time securing the advantage of a more speedy healing. But it is hardly probable that we shall secure both to their full extent. If many leaves are left on the stump, some injury to the tree will result from their summer removal; while the healing process will doubtless be less rapid than if the whole original foliage of the limb were separated at once. Yet we are disposed to regard this method with favor, as avoiding in some degree both evils.

Fig. 423.

In this connection, we offer a practical hint for the mechanical removal of limbs which require the use of the saw. To prevent splitting the bark on the lower side as the limb falls, first make a small cut beneath and opposite to the main cut made by the saw above; or if they do not quite coincide, let the lower one be slightly nearest the tree. This mode will not only leave a smoother face, but will save time and trouble to the operator, who must otherwise hold the branch with one of his hands or by an assistant. The sawing off of the stumps above mentioned is rapidly and easily done without any such care.

Impressions of Fruit.

First cut the fruit accurately through the centre with a sharp, thin-bladed knife, splitting first the eye and then cutting down and splitting the stem. By a little practice this is done without difficulty or failure. The appearance presented is like that in fig. 424. Then with a pen or camel's-hair pencil, touch lightly the exterior of the cut face with ink, including the stem, to which the ink should be applied more heavily. Then press the whole face on a sheet of thick unsized or blotting paper, taking care that every part comes in contact with it, and pressing the stem down firmly. Then remove it, and a perfect outline will be left. The moisture of the fruit will dilute the ink on its cut face, and a soft, distinct impression will be made (fig. 425), much resembling a neatly shaded picture, if carefully done. A little practice will enable any one possessing a moderate share of skill to make very satisfactory impressions.

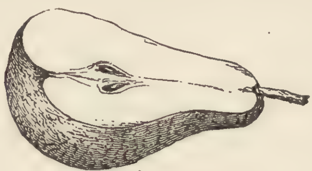

Fig. 424.

Pears which are ripe and melting will have too much water on the cut surface, unless it is first partly absorbed with a sponge, piece of cotton, or with blotting paper, before the ink is applied; and the fresh picture may need some drying by the same means.

In making pictures of apples, or of any fruits which have deep cavities at the ends, the outline, to be complete, must be finished by bridging across these cavities with a single pencil line, by using the eye. Fig. 426 shows the way in which this is done, the dotted lines being those which are added. These lines are often of much importance by way of showing whether the fruit is smooth, even, ribbed, irregular, &c. More perfect and striking pictures may be made by using colored inks, to correspond with the color of the fruit—crimson, orange, yellow, green and scarlet, according to the particular shading of the skin—and when the fruit has a red cheek on a yellow or green skin, each side of the cut surface may be touched with its peculiar hue. Even the red stripes on apples may be imperfectly represented by using some care. The easiest way to apply the colors is to procure a few colored crayons of the softest in market,

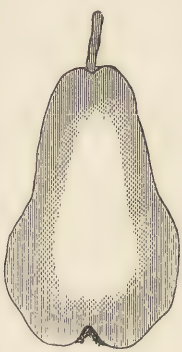

Fig. 425.

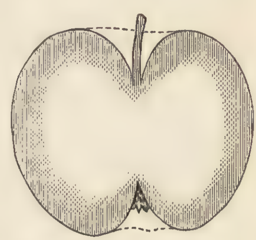

Fig. 426.

and by taking the fruits before they become mellow, the colors may be readily rubbed on the cut edges. In this case the blotting paper should be used.

A good sized book of blotting paper, prepared by the book-binder, may be used for the impressions of all fruits which can be cut through the centre; and such a book, with its yearly additions, will become a volume of much value for reference.

Sulphuring Grapevines.

C. B. Campbell of New-Jersey describes the following contrivance for applying sulphur to his grapevines for destroying mildew:

A convenient method is by the use of a sort of tin *pepper box*, fig. 427, say 10 inches long, 3½ inches in diameter at one end, and tapering to 1½ inches at the other. The larger end is soldered tightly, but perforated in the usual way, to admit a free passage of the powder or sulphur. The smaller end is open and is closed with a cap when in use. The cap should be 2½ inches long, with a ring soldered on the side to receive the finger to hold it on. This box is used for dusting the vines the first time, about the blossoming season.

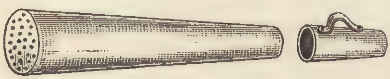

Fig. 427.

When the foliage is fully out, and dusting is to be done more extensively, the common sulphur bellows is used, but the objection to this is that too much time is required to go over a vineyard; besides a much cheaper apparatus is easily made—a tin box 3 inches deep, 4 inches in diameter (or square) at the top, and 6 inches in diameter (or square) at the bottom, can

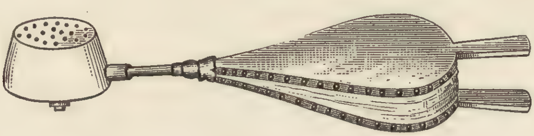

Fig. 428.

be fastened to a common fire bellows, the pipe entering the box on one side near the bottom, through a short tube or socket, and the whole made firm (fig. 428.) The top of the box is perforated as usual, and the bottom has an inch and a half aperture to receive the sulphur, which is closed with a cork when in use, the cork being inserted in a short tube or socket soldered in. The apparatus can be easily made by any tinman, and used with any old-fashioned fire-place bellows. With it, an acre of vines can be dusted in two or three hours. It is well to put into either of these boxes three or four good sized gravel stones, or an equivalent, to fine up the sulphur and prevent clogging.

Care should be taken to protect the lungs from the sulphur, by muffling

the mouth and the nostrils with flannel, and some will find goggles necessary to protect the eyes. Keep to the windward side of the vines.

GEO. W. CAMPBELL thinks the sulphur remedy for out-door grapes may be relied on greatly to lessen, if not entirely prevent, attacks of mildew. He has used it for many years on the Delaware, and on nearly all varieties subject to mildew and rot, and always with apparent success when timely and persistently applied. He commonly uses the sulphur in connection with freshly slaked quicklime—the latter to prevent the bellows, through which it is blown, from becoming clogged by the sulphur.

Mr. BATEHAM has confidence in sulphur, and applies it early and often; the first time as soon as the fruit is set, or earlier, repeating every two weeks until it is nearly ripe.

MISCELLANEOUS NOTES AND SUGGESTIONS.

LIQUID GRAFTING-WAX.—The following ingredients are recommended by some authorities: A pound each of rosin and tallow melted together; cool and add a spoonful of turpentine; add further four ounces of alcohol, and two ounces of water; heating again and stirring briskly. It should be about equal in consistency to honey; if not, add a little more alcohol, and a smaller quantity of turpentine. Keep in a bottle and apply with a brush, the cork forming the handle, as shown in fig. 429. It is a good application for wounds made in pruning.

Fig. 429.

CULTIVATION OF ORCHARDS.—Prof. BEAL says he has never seen or heard of an apple orchard injured by too frequent culture, but admits that in some of the States it may not be necessary after the trees have become well grown and established. When to cultivate or not, he remarks, depends on several conditions. If the color of the leaves is good, and the growth good, and the trees bear well of fine fruit, they are doing well enough even if in grass. But if the leaves are pale, the growth of the annual twigs much less than a foot in length on trees set twelve years, and the fruit small and poor, something is the matter, and they are suffering for want of the plow, harrow or cultivator, or a heavy mulch or coat of manure.

DRAINAGE OF FRUIT LAND.—The Gardener's Chronicle relates an instance of one who planted apples, pears and cherries upon heavy clay—trenching it down to an iron hard pan. The trees made no growth, lichens grew upon them, and they seemed about to die, when the orchard was thoroughly drained. In six months the lichens began to disappear. The succeeding season a large growth was made, and the orchard became vigorous—all because of the warming of the soil incident to the drainage.

The importance of a dry bottom to vineyards was shown us on a visit to a vineyard on the Hudson. A portion of it had been planted on sloping wet ground, and did not succeed well. A tile drain three feet deep was then placed midway between the trellises, and it became an excellent vineyard.

DEFECTIVE POLLEN.—The Rural New-Yorker gives an account of an experiment to ascertain the importance of the pollen on young fruit trees that blossom for the first time, or in the first year of blooming. A young cherry tree bore blossoms but no fruit. When it blossomed the second year, pollen was applied from an old cherry tree to the stigmas of certain marked flowers. These alone formed and ripened fruit. This experiment suggests a shorter mode of obtaining fruit from young trees of new sorts.

BARK LOUSE.—C. V. Riley, in Colman's Rural World, says that the oyster-shell bark-louse may be destroyed in spring just after hatching, by the applicatiou of alkaline washes, such as lye, soapsuds, or whitewash, and that the eggs under the scales may be killed during winter by washing or syringing the trees with coal oil, diluted with three parts of water. Prevention, by an examination of all infested trees before planting, is particularly recommended.

PROFITABLE ORCHARDS.—The Rural Home describes the apple orchards in Parma, Monroe Co., N. Y., showing the profitable character of the business in that favorable locality, on the south borders of Lake Ontario, and north of the city of Rochester. Among others, the orchard of John Collamer is mentioned, which contains 1,100 trees, mostly of the Baldwin and Twenty Ounce. From this orchard $3,000 worth of fruit was sold in 1876, the price being rather high at that time. Another farmer by the name of Tinney, has two acres of the Bartlett pear, barren sometimes, but the annual crop from which has averaged from $500 to $700. John Tinney, a son, has 1,400 bearing apple trees. From his Twenty Ounce trees alone he sold 700 barrels in 1876. All these orchards are well cultivated ; that of Mr. Collamer without any other crop.

THINNING FRUIT.—Additional facts come before us every year showing the importance of thinning fruit on the trees early in the season. E. Moody of Lockport stated some years ago that while the large, handsome peaches on his thinned trees brought $1.50 per basket, the same sorts on crowded branches sold for only 50 cents. More recently Mr. Dyckman of White Haven has cited instances where his thinned crop readily brought $2.50 per basket and the unthinned brought only $1.25. There is less difference when the trees are young and bear large specimens, but as they become older and more productive, the difference becomes very distinct.

But the increased price is not the only advantage. An overloaded tree is soon exhausted. A large orchardist in Ohio lost his 3,000 trees by the cold of winter, after a very heavy crop ; while trees which had not borne were uninjured. We had a fine plum orchard nearly ruined some years

ago in the same way, after several very heavy and unthinned crops, resulting from a thorough destruction of the curculio. It is much easier to thin out poor specimens early than to hand pick all, and then assort them.

A writer in the Practical Farmer mentions the practice of a neighbor who keeps his crop of apples properly thinned by pruning, preventing the dense mass of shoots often seen, and the profuse crop of fruit on them of small size and poor quality. This neighbor's apples are fully twice as large as most of the specimens grown elsewhere and of fine appearance and flavor. Now he does not adopt the common practice of waiting till the tops of the trees become a mass of brush, and then thin this out, but he begins as soon as the young trees are set out, reduces the branches, places them at regular distances, and keeps the heads properly thinned by *preventing* a thick growth.

A. S. Dyckman, who has extensive peach orchards at South Haven, Mich., gives the horticultural society of that place the following account, in substance, of his mode of thinning the crop : A part of the thinning is effected by pruning, when this is needed. The cost is about five cents per bushel, and the market price is often doubled by the operation. The rule is to leave one peach on a shoot six inches long, and two on a limb a foot long. Make the spaces between them as even as practicable. For this purpose it is often necessary to remove nine-tenths. Finish one branch at a time ; work from the centre of the tree. It saves labor at the regular picking, assorting and packing. Another important advantage is in preventing the exhaustion of the trees. The work is done soon after the fruit sets.

Close Summer Pruning.—A correspondent of the Fruit Recorder gives an account of an experiment where he pruned back the new fruit-bearing shoots when a foot long, and as a consequence the grapes on these shoots were not half as large as the grapes on vines that were allowed a free growth. To grow and mature well, the fruit must be fed from a sufficient number of good, well-developed leaves, most of which were removed or prevented by the close pruning.

Apples for Maine.—We observe among the sorts which took premiums at the third annual exhibition, as indicating those most popular in that State, the following: Gravenstein, Tompkins County King, Sops of Wine, Jewett's Fine Red, Winthrop Greening, Roxbury Russet, Golden Ball, Duchess of Oldenburg, Fall Harvey, Hubbardston Nonesuch, Porter, Yellow Belleflower, Tallman Sweet, Baldwin.

Apples for Missouri.—Colman's Rural World gives the following list after examining and testing a large number, as the very best for carrying a supply through autumn, winter and spring : Rome Beauty, Smith's Cider, Jonathan, Rambo, Winesap, Ben Davis and Rawle's Janet. In addition to these, Baldwin, Esopus Spitzenburgh and American Golden Russet are fine, but do not yield so full a crop.

SORTING APPLES.—Prof. J. W. Beal of the Michigan State Agricultural College, Lansing, says a very good way to manage the sorting of apples into grades, where there are several pickers, is to have a cushioned box holding a couple of bushels, placed upon movable wooden horses. The pickers turn the fruit carefully into the padded box, and one can sort and grade for several that are picking. It pays most emphatically to place upon the market only the very best, and sorting carefully becomes a necessity.

BURYING APPLES.—The practice of burying apples to keep during the winter, if the proper conditions are observed, does well, and in those districts of the country where the crop is larger than the cellars of the owners, it may be profitably resorted to. The first requisite is to select only good keepers, that usually last through winter. Secondly, choose a very dry piece of ground, where there is a natural drainage ; and better if under the shelter of evergreen trees. Instead of placing the apples on the bare ground, first lay a thin stratum of stiff rye straw, corn husks or soft evergreen branches, which will keep the fruit comparatively dry, without excluding the warmth from below. On this stratum place a heap of apples, and then cover them with plenty of straw, which will be 8 or 10 inches thick when packed. Three inches of earth outside of this will protect them from freezing. Turf makes an excellent covering, and 6 inches of dry forest leaves, instead of straw, will answer an excellent purpose. Apples do not need so much protection as potatoes. There should be a ventilating hole at the top, filled loosely with straw, or the heated air collecting there will make many rotten apples at the apex of the heap.

STOCKS FOR DWARF PEARS.—Many years ago Ellwanger & Barry of Rochester had a very fine and promising orchard of dwarf Doyenne pears. Just as it had fairly come into bearing, the black mildew or scab began to attack it, in common with nearly all other trees of this sort in Western New-York, and when no hope appeared for improvement, they worked these trees over to the Duchesse d'Angouleme and some other sorts. By inserting many grafts into different parts of each tree, towards the stem or centre, the entire change to good bearing trees was effected in two or three years. This was done many years ago, and the trees are now among their best and most valuable dwarfs. They recently expressed their opinion that there is no stock for dwarfs equal to that of the Doyenne, on which these double-worked trees grow.

PRUNING DWARF PEARS.—The successful culture of dwarf pears depends on four essential requisites, namely—1. A locality where they are found to succeed, for in some places they fail, although this failure is sometimes attributed to unfavorable locality, when it is more the result of neglect. 2. Good cultivation and annual enriching of the soil, especially at the North and East. Where the soil is naturally fertile and the summers hot, less cultivation and manuring are necessary. 3. Pruning, to prevent

too many fruit spurs, and to favor a growth of vigorous shoots. 4. The selection of such varieties only as grow freely on the quince, as Duchesse d'Angouleme, which is the hardiest and most enduring; Louise Bonne of Jersey, Doyenne Boussock, Beurre Superfin, &c. In severe climates, mulching for winter is important and essential, and is useful everywhere.

HEADING-IN PEACH TREES.—A. C. Younglove of Vine Valley, N. Y., finds it unprofitable to cut back the young shoots of peach trees every year. He allows the tree to grow four or five years, and then cuts back large limbs early in spring. New shoots spring out, and the size and quality of the fruit are greatly improved. It is important, of course, to do this work right, and not blindly and blunderingly.

PLUMS FOR MARKET.—G. Ellwanger gives the following list as the most profitable market plums: Bradshaw, Coe's Golden Drop, Fellenberg, Lombard, Yellow Egg, McLaughlin, Peter's Yellow Gage, Reine Claude de Bavay, Shropshire Damson, Victoria. For drying—Fellenberg, German Prune, Prune d'Agen, Wangenheim.

GRAPES AT MONTREAL.—The Report of the Fruit Committee of the Montreal Horticultural Society gives the following rules for the management of grapes in that climate:

1. Ground thoroughly underdrained.

2. Well pulverized garden soil; the richer the better.

3. A southern exposure, where the full benefit of the morning sun may be had. Fruit will ripen at least a week sooner, if grown against a wall or fence. Protection by means of a belt of trees or fence, against the cold north or east winds, is a great safeguard in our northern climate.

4. A covering of from 4 to 6 inches of earth or other material, in winter.

5. Constant, but not severe pruning; a certain amount of pruning being requisite to bring fruit to perfection.

The renewal system (*i. e.*, that a cane should be allowed to grow to replace the fruit-growing cane of the same season, which is cut out in the fall) has proved the most successful.

6. That the vine should not be allowed to overbear, which under good cultivation it is sure to do; the consequences being seriously felt in succeeding years.

LONG KEEPING GRAPES.—The sorts which have thin and tender skins, like the Concord, do not keep well; but thick and tough-skinned grapes, like the Diana, remain fresh a long time, if in a dry, cold room. The old Isabella is well known as a good keeper, so is the Catawba, the Walter, and thick-skinned Rogers' hybrids; as for example, the Wilder. All sorts keep best if well grown and fully ripened on well pruned and well cultivated vines, so as to give them a rich juice. Poorly grown and watery, they soon spoil.

PACKING GRAPES.—A successful shipper gives the following as his method of picking and packing, when large boxes are used, and not the small fancy boxes, although the same general directions will apply to both:

Gather the grapes only in dry weather, cutting the stalk with a sharp knife ; remove carefully all defective berries from each bunch, taking special care not to rub off any of the bloom, as on this precaution depends greatly their appearance in market. A shallow hand basket may be used to receive them. Carry them to the packing room, tip the boxes with a blocking slightly towards you, and lay the bunches in, one at a time, carefully, so as to fit well together, in regular layers, making an even top without cutting bunches, and with stems under and concealed. This will require some skill and practice. They should stand several hours before the cover is placed on them, and the box should be full enough for the surface at the top to project an inch or more above the rim, so that when the cover is pressed down to its place, their elasticity may keep them compactly together without rattling in carrying. We have seen grapes utterly ruined by not being packed compactly to prevent rattling.

Planting Strawberries.—Wm. Parry, who has been so successful in the culture of small fruits, adopts the following course as a good one, in setting out strawberry plants : He plows furrows two and a half feet apart, and spreads along them a mixture of equal parts of muck, marl, ashes and ground bone. They are to be mixed a fortnight before using. Three-fourths of a ton of this mixture per acre, gives a luxuriant growth to the plants. This result might not be so successful on all soils. These rows are cultivated with a horse. He finds a good coat of stable manure just before winter, of great importance.

Autumn Setting Strawberries.—P. T. Quinn says that strawberries may be set in September, if the following conditions be observed, namely, a rich soil, deep and mellow ; strong plants of the same season's growth, with plenty of healthy roots ; damp weather at transplanting, or if dry, successive waterings ; and mulching with yard manure before cold weather sets in. To which we would add, that if the soil is strong or inclined to be clayey, it should be trodden compactly over the roots and left a little convex, to throw off water and prevent heaving by frost. We have never found transplanting to succeed well after August, and if the weather is dry in that month, the difficulty may be fully remedied by cutting off the larger and older leaves, and mulching with manure an inch and a half thick, which will hold the moisture of watering, and permit successive waterings afterwards without hardening or crusting the surface. Large plantations are to be set in spring, when the work is more easily and safely done.

Summer Fallowing for Strawberries.—A successful cultivator says it will pay to summer fallow preceding the planting of strawberries, to get rid of all the weeds, even if it has to be done all the season through. Much will depend, however, on the frequency of the stirring. It should be done as often as a new set of seeds, turned up near the surface, break into sprouts. Plowing or harrowing every week or two will accomplish more in six weeks in warm weather than the whole six months with a few stirrings.

A Good Brier Patch.—The most profitable plantation of blackberries which we have met with, was growing in New-Jersey, in 1875, a few miles from Philadelphia. It covered densely seventy-five well cultivated acres. On the day of our visit there were 260 persons at work gathering the berries, which were Wilson's Early. On inquiring of the owner what his sales were, he replied, "We have a slight crop this year—not much over half of one, and our sales will not exceed over $15,000. Last year we had a good crop, and sold $22,000 worth." As an indication that the soil was admirably adapted to the blackberry the wild bushes growing at the roadsides in the neighborhood were loaded with berries.

Profitable Raspberries.—The Burlington County (N. J.) Agricultural Society awarded to Wm. Parry the premium for raspberries, on his ten acres of the Brandywine, which yielded 26,300 quarts—over 82 bushels per acre—affording a net profit of $280 per acre. The gross sales were $4,338; expenses, $1,538. Hair manure only was used, at a cost of $10 per acre.

Planting Raspberries.—Wm. Parry gives, in substance, the following directions for making new plantations: Select a well-drained soil, enrich it early in autumn or cover with manure and fertilizers; plow and prepare well, and open deep furrows 6 feet apart for the rows, in autumn. Spread muck copiously in the furrows during winter. As early in spring as practicable, set the young plants along the rows on the muck, 2 feet apart. Cover the roots with a small plow, going once around each row. Tread firmly around each plant while holding it upright, cutting each stem off near the ground. Potatoes or other vegetables may be grown the first year between the rows, after which they will need the whole occupancy of the ground.

The following is the substance of the directions for raising raspberries from cuttings of the roots, given by Mr. Parry, which may be adopted when rapid propagation is needed, or large quantities required: In the autumn, after the leaves have fallen, dig up the plants with all the roots that can be secured. Cut the roots into pieces about two inches long, and pack them in a box with damp moss, or clean, coarse sand, or damp sawdust. The bottom of the box is to be sprinkled with this material, and then alternating layers of this and the cuttings fill the box. Put this box in the cellar. The cuttings must not be allowed to become dry, although a slight moisture is sufficient. In a few weeks the cuttings will have formed buds and calluses. They are set out in open ground.

Setting Green Raspberry Plants.—The Fruit Recorder describes the process, now well known, of transplanting young raspberries, when only six or seven inches high, and in full growth, in the early part of summer. The work is as safely performed as setting tomato plants, and they make a fine growth the same season. Take a pail to hold the plants while digging them; take up with a fork, so as to save a large part of the cross roots; mud the roots, well, and set out near evening, or on

a cloudy day. The mudded roots, packed in moss, may be sent long distances by express.

The same paper gives the most successful planting of raspberries as in autumn, by the following mode: The young plants were carefully set, the roots well spread out, and the mellow earth which covered them, beaten with the hoe over the plants, to show where they were. As soon as the ground froze in winter, a wagon load of manure was driven over the plantation, and a shovelful placed on each beaten spot. Early in spring the whole surface was harrowed, which scattered the manure and mixed it with the soil. This mellowed the soil and destroyed the weeds that were just ready to come up, leaving a clean surface till the young raspberries were half a foot high.

HOT-BEDS.—The Fruit Recorder thinks the best manure for hot-beds is a mixture of forest leaves and stable manure; and that the best way to obtain this mixture is to use leaves to litter the stables in winter.

ROAD MAKING.

THE PUBLIC ROADS in the United States have cost several hundred million dollars; and keeping them in repairs an expenditure of many millions. They are worth to the people much more than they have cost, for without them, and deprived of the advantage of market and many other facilities, the present state of business, and the present population could not exist. An immense loss is sustained by the bad quality of the roads, where they might, without difficulty, be much better. Farmers generally do not sufficiently appreciate the importance and value of good thoroughfares; the fact that a farm will sell at a much higher price when adjoining a fine, smooth highway, than on a muddy and impassable one, should convince any one of their great value.

It is not necessary, in ordinary practice, to resort to the high-priced Macadam mode of construction, or even the cheaper and equally good Telford road. Their advantages away from towns or heavy travel would not warrant the outlay. But a great deal may be done by making a wise use of the materials at hand. A considerable portion of the soil of the country at large is composed of ingredients, which form good road beds, as for example when it consists largely of fine gravel, with a natural under-drainage. Little more labor is needed with such soils than to make a smooth surface, and to provide the necessary bridges.

But most of our soils are not so favorable to good road-making. They contain enough clay or other soft material to work up into mud after every heavy rain. They are without natural drainage, and this mud, when once worked up, is often retained on the surface a long time, because there is no way for the water to escape, except by natural evaporation. The two

great requisites, therefore, in the construction of most of our public roads is—1. To use the best material which the soil or subsoil affords. 2. To provide ample drainage beneath them.

1. THE MATERIALS.—In many places the surface soil, for several inches or a foot in depth, is a rich, friable loam, often containing a good deal of vegetable matter, which proves excellent for growing a crop of corn or potatoes, but which is easily worked into mud by the feet of traveling horses, or cut into deep ruts by the passing of heavy wheels. Below this soft surface is a hard subsoil, which withstands the beating of the feet or the roll of the wheels. Some specimens of bad road-making have shown the great superiority of the under material. In one case a high "turnpike," or raised road-bed, was made by plowing the black and rich soil on each side, and scraping it into a high and broad ridge at the centre, on which heavy wagons and light carriages were expected to run. In making this road-bed of rich muck, a strip of hard subsoil was laid bare on each side, forming a broad ditch. It was amusing as well as instructive, to see the very men who coustructed this road, when the time came that the oft "turnpike" was cut a foot deep with ruts in wet weather, resorting to the smooth, hard, denuded surface of the subsoil on each side, in drawing their grain to market. They did not, however, accept the lesson thus taught them, but continued in after years in the same practice of heaping up soft surface earth and sods to make into public highways. Such a road is rep-

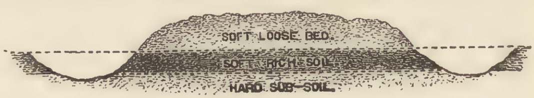

Fig. 430.—*Cross-Section of Soft Road-Bed.*

resented in cross-section by fig. 430. The soft surface soil is plowed up and scraped towards the centre of the roadway on other soft earth, as a foundation—which is indeed not so good as the sandy foundation on which the foolish man built his house, for sand would be better than this muck. The next plowing and scraping goes a little deeper, but does not reach the hard subsoil. With this the road is completed ; and with the double quantity of soft material thus heaped up, is not so good as the original surface, except so far as shallow ditches may have been made on each side. (The dotted lines show the natural surface and the depth of the soft soil.)

Fig. 431.

After a long series of early spring rains, it is not very unusual to see such roads cut into regular and parallel lines of deep ruts, extending mile after mile, a cross-section of which is imperfectly represented by fig. 431.

Some improvement on this mode is effected by going deeper, so as to

bring up a portion of the hard earth below, and with it facing the top of the muck bed, and with good ditches at the sides, as shown by cross-section in fig. 432. For light vehicles, this does very well, as they pass

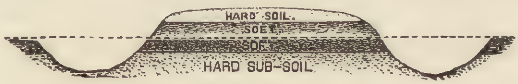

Fig. 432.—*Bed of Muck Faced with Hard-pan.*

lightly over the trembling surface, without disturbing the deep soft bed below. Not so with 50 or 60 bushels of wheat on the heavy farm wagon. When the top becomes softened by water, the wheels grind through, and it is hard to say where they will be likely to bring up—probably at a slightly greater depth than the ruts shown in fig. 431.

Such results as here described naturally suggest a different mode of making roads with such soils; and if a regular system is adopted, it may be accomplished with comparatively small expense, with excellent and durable results. First scrape the rich top soil on the adjacent fields, or use it for compost heaps, especially if largely of turf. Then make shallow ditches on each side of a smooth central road-bed, as shown in fig. 433. When once well finished, it will need almost no repairs for many years. The

Fig. 433.—*Road of Hard Subsoil.*

hard material will remain there. The interest on the cost of making the road will be less than the yearly cost commonly expended on muck-beds.

This treatment will not answer for all soils. The management must be varied more or less with circumstances, the road-maker using his judgement. This practice is described as a specimen of the use of good material and the rejection of bad.

2. Drainage.—This is always useful, and should never be omitted in any instance, and especially with a costly stone or gravel road. It will often convert a muddy road into a dry one, other things being the same. Any one may be easily satisfied on this point if he will remember that a muddy road becomes good in dry summer weather. If roads could be always kept dry, much of the trouble would be obviated.

Open drains cannot be made deep, and they ought never to be so deep as to prove dangerous in case of running too far to one side. They are useful only in carrying off surface water. A sloping bank, to retain its position, cannot well be steeper than with a rise of one foot to a foot aud a half horizontally. An open ditch, therefore, only a foot deep and two feet wide on the bottom, must be five feet wide at the top. Two feet deep would require a width of ten feet. It would be better that road ditches have less steepness.

To effect proper drainage to a road, it must be provided with tile or

covered drains. These indeed are much cheaper than open ditches for all except surface water. One good tile drain running lengthwise with the road, and under the centre of the wagon track, would often effect wonders. It should be covered with broken stone or coarse gravel nearly or quite to the surface, with finer gravel at the top. Two, or even three, such drains, parallel and a few feet apart, wonld be still more effectual. At every low place, outlets should be provided for them. They need not cost over $300 a mile where materials are at hand. The interest on this sum is less than the cost of the labor often expended annually towards keeping a common road in bad repair.

IMPROVEMENT IN DOMESTIC ANIMALS.

By Mason C. Weld.

IN THE COURSE OF AGES those classes of animals which we most naturally regard as included in the term "domestic animals," have become more and more adapted to the needs of civilized man, and it is his profitable privilege to maintain them so, and to improve them, if he can, by breeding them nearer and nearer to such standards of perfection as seem to combine the most value. To this end associations have been formed, *standards* have been determined upon, *scales of points* made out, agricultural societies offer *prizes*, and *books* almost without number have been written, and more than all, and earlier than all, the *pedigree* was recognized as the most important of all means of permanent improvement.

In civilized society the generality of men violate in their own lives so thoroughly all the principles and practices of correct breeding that it is hardly to be wondered at that they are careless about their cattle—great and small.

A pedigree is never valueless if only it be truthful, and its value depends upon the fact that the young are likely to resemble their parents in important respects, and also that after a succession of generations in which particular characteristics are prominent or peculiarly developed, the tendency to reproduce the same in subsequent generations is greatly strengthened. This tendency is modified by natural laws, and it is found that animals, in whose breeding there has been a great departure from the normal type, possess an increasing tendency to revert towards some original or earlier form. Indiscretion in breeding, especially holding too closely to particular characteristics, may and does induce constitutional weakness, shortness of life, liability to disease, &c. Thus are we hemmed in with difficulties and forced to breed with an intelligent regard for

the laws of health. The breeder's aim is to improve his stock in the development of valuable qualities, and at the same time not to impair their constitutions. The value of honestly kept public records of pedigrees published periodically, and called "Stud Books" and "Herd Books," is therefore very great.

Among the breeds of domestic animals those are the most fixed in type and most permanent in character, soundest in health, and, as a rule, the hardiest, with the formation of which man has had least to do.

Breeds of Horses.

Compared with other races of horses, the Arabian holds a pre-eminence which none can deny. We have no evidence that he owes any of his good qualities to man, except indeed his docility, and even that may arise from his intelligence in freely acknowledging man as the superior animal, and a readiness to accept the situation as his familiar servant and trusted friend.

The habits of the horse in a wild state are exactly calculated to develop those qualities for which he is most valuable and useful. He seeks safety in flight; as a rule would rather run than fight. His food is close, sweet herbage, which necessitates much travel and often long journeys for pasturage and water. Among themselves supremacy is mantained by the leaders of herds through the use of their teeth and heels, and most terrible fighters they are when aroused. Wild horses develop, therefore, naturally speed, endurance, hardiness, strength, wind and soundness in every particular, because by these qualities the race is maintained. And no doubt it is because the Arabians use the horse in ways so closely agreeing with his natural instincts and tendencies, and at the same time, by furnishing superior food, by keeping pedigrees with great care, and studying them, or rather perhaps following sage maxims, they have preserved the original race unimpaired, and have possibly improved upon it.

The number of horses in the United States by the last census was 7,145,370. America had originally no horses native to her soil; but in Europe, Asia, and Northern Africa various breeds existed, which were modified by climatic influences, and by the demands of man. They were used for the chase, as beasts of burden, for draft and for war, and have undergone changes according to the systems of breeding, training and use to which they have been subjected.

The American Trotting Horse is rapidly gaining at least one of the distinctive characteristics of a breed. Through the crudest system of breeding, neglect of pedigrees, and false reasoning, combined however with unprecedented shrewdness in selection, and tact in training trotters, we came to be possessed of a great number of excellent trotting horses, and among them several sires which imparted their trotting powers strongly to their offspring. This occurred at a time just previous to and during a period of great commercial prosperity, when money was plenty, and when

the luxury of a fast road horse could be indulged in by a very large number of persons. The result was that speed in a horse, whether already developed or presumably latent, was paid for most liberally. Style, form, soundness, and even bottom, were secondary considerations.

Following the gradual contraction of currency which has taken place, a period of commercial depression has come. Where one hundred men could own roadsters, and even trained trotting horses, a few years ago, perhaps five can do so now; hence the primarily useful horse again comes to the front, and a selection is made of those combining the good qualities of speed, bottom, constitution and pedigree, for breeding purposes, brought about by the necessities of the times; this bodes well for the future.

It is a subject for congratulation that we have now, through the perseverance of a few individuals, much accurate knowledge of the pedigrees of our trotting stock, and that our prominent breeders, who are now really worthy of the name, are pursuing definite and generally reasonable systems in the place of the wild, hap-hazard breeding which prevailed a few years ago. The result is that speed is increasing. There are more very speedy horses, and a few show better speed than was even deemed possible. Nothing shows this better than the classification of horses for races. Purses are now offered to be competed for by horses that have not trotted in "better than 2:19," whereas a few years ago the "2:23 class" was the lowest, and horses which had records of having trotted a mile in less than two minutes and twenty-three seconds were, of course, in the "open for all" class. Thus the "time allowance" has gradually been shortened within the recollection of all from two minutes and thirty seconds. The most important result reached is, however, the establishment of the indisputable fact that speed may be bred—that certain combinations of blood are almost certain, and on an average certain to give extraordinary speed with a natural trotting action.

DRAFT HORSES.—While this great improvement of our trotting stock has been going on, the breeders of draft horses have not been idle. The two best breeds of draft horses in the world, those of Scotland and of France, have been freely drawn upon. The number of importations of Clydesdale horses, chiefly stallions of notable excellence, must exceed two hundred, while the number of Percherons imported will certainly reach twelve hundred. These are increasing the weight, symmetry and power of our draft horses greatly, which may be observed especially in the class of horses used for draft in all our principal cities. The French Norman blood seems best adapted to our uses, and of this there are two rather distinct types, the Percheron and the greater Norman. The two are so mingled in France that much confusion exists, and the French utterly ignore pedigrees. In this country they are carefully kept. Those of the Percheron type are smaller, more active, exceedingly muscular and powerful, having good trotting action, fast walkers, weighing 1,250 to 1,600 pounds. The Normans will weigh 1,700 to 2,000 pounds, have similar characteristics of

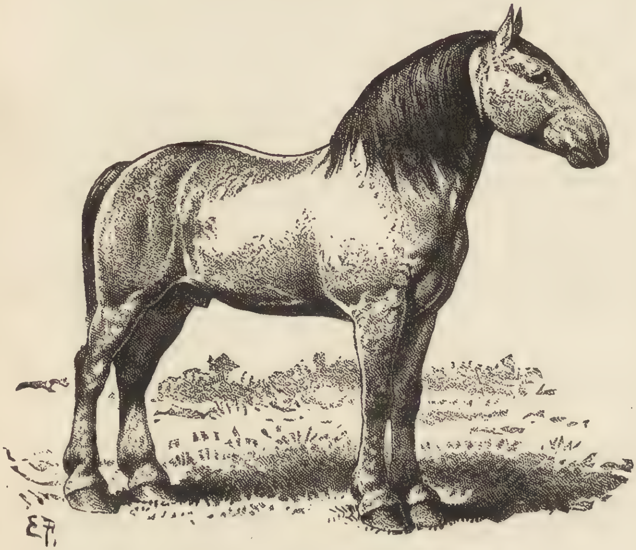

Fig. 434.—*Percheron Horse Washington.*

a lower degree—that is, walk well, trot finely, are docile, powerful and well formed.

The accompanying engraving (fig. 434) is a copy of a photograph of "Washington," imported by J. J. Parker of Westchester, Pa. It exhibits well the characteristics of the breed. The foreshortening, as in most photographs, enlarges slightly the head and forequarters.

Breeds of Neat Cattle.

It is altogether probable that the number of neat cattle in this country has never increased so rapidly as since the taking of the last census (1870), in which they are stated as numbering 23,820,608. The very recent trade in fresh beef and beef cattle with Great Britain gives additional importance to everything connected with their breeding. Common cattle mingle and breed freely with the zebu, the yak, the bison, and it is said with several other apparently distinct species. Of course this blending of blood indicates possibilities in breeding peculiar forms and habitudes, adapted for specific uses, which is almost bewildering. At the same time it suggests a way of accounting for the great variations among the races and breeds of the species *Bos taurus*.

This is an interesting subject for the naturalist, but for the farmer it has only a general value. We have here half-a-dozen well defined breeds, all derived from Europe, most of them from Great Britain. Others there are

indeed among us, but they are in small numbers, and we would be quite as well off agriculturally without them. We will consider them briefly in the order of their intrinsic merit.

SHORT-HORNS.—The improved Short-Horns have been carefully bred for about 150 years. From the first, or soon after the first successful efforts towards their improvement were made, pedigrees have been kept and regarded as the basis of all improvement. Animals which improved their own qualities upon their progeny were sought after and bred to if males, or cherished if females, their progeny being closely bred together, or to their sires. Thus, in the most famous lines, a constant crossing and blending of kindred blood takes place which makes a maze of relationships, and would set a "garter king at arms" crazy if he had to blazon a shield with such "quarterings" and "differences," for a human princess or duchess, as are called for by one of the Short-Horn pedigrees.

It is not likely that essential improvement has been made in the forms of Short-Horns within 60 or 70 years. A few animals existed then which were accepted as near the standards of perfection—these standards being based upon primarily useful points, especially upon beef points, and the breed has been propagated with these characteristics in view. As a result, we find more animals approaching that criterion of excellence than ever before. At the same time there are more animals bought and sold on pedigree alone. This tendency unduly to exalt pedigree above form, constitution and reproductive vigor works its own cure through the disappearance of those families too long and too closely bred, while cognate blood into which fresh strains have been poured will remain vigorous and useful.

We observe, as the fundamental fact in Short-Horn breeding, that close in-and-in breeding produces that property of improving its own qualities which is characteristic of thoroughbreds; while in mating males with females of less force and intensity of organization, as shown by their pedigrees, although they may be of the same general breeding, results are obtained in which the combined excellencies of the parent stocks are measurably free from constitutional defects. Similar results are seen when any well bred bulls are used with common cows, and, indeed, thoroughbred or well bred males with any scrub or inferior females. In such cases we may look for results by no means intermediate between the two combined stocks, but in useful points the grade animal is often the superior to the full blood. This is, however, rarely or never the case when other than full-blooded males are used as sires. So it occurs that in taking out-crosses to give constitution, the great improvement is seen in the first generation, recourse being subsequently had to bulls of purest pedigree.

The Short-Horn breeder must therefore be a student of pedigrees, not only that he may see the course of breeding followed with success by those who have gone before him, but to know what the blood of his own stock is; what related families exist with which favorable crosses may be effected; what out-crosses may from time to time be taken with success, and what

should be avoided. It involves a study of points also, and of constitutional tendencies, of the credibility of records, and of individual breeders. The fact that a breeder, or one whose name stands recorded in the pedigree of an animal, is or was a man of jockeying proclivities, is a stain upon the pedigree, and will so remain forever. It is fortunate that both in England and America there are few such names defacing the herd-books. It is in vain the cow jockey covers his tracks, his character will be suspected if

Fig. 435.—*Duchess by Daisy Bull* (186), *drawn by E. Forbes after a Painting by Dalby.*

not known, and this serves as a blemish upon stock of his breeding ; the animals sell at lower prices, and the low prices themselves operate to the disadvantage of the cattle, and to that of their progeny and kindred.

It is equally true that in no business do high personal character, uprightness and good business habits pay better, especially if combined with good judgment and what may be termed breeder's intuitions. To be successful as a Short-Horn breeder now-a-days requires all this, and a very considerable capital.

Short-Horns as Milkers.—This noblest and best bred of all breeds of neat cattle has been cultivated in most sections chiefly with a view to beef production, milk and butter having been secondary matters. Its capacity, however, for yielding milk and butter is probably not exceeded by any of the peculiarly milking breeds. Some of the smaller breeds, as the Ayrshires, are probably more economical milk producers, as they consume less food in proportion to the milk given. Those families of Short-Horns which have been bred for several generations as milkers exhibit great capacity, and though the cows milk down to little besides skin and bones sometimes, yet when they are dry they take on flesh rapidly, exhibiting often as symmetrical forms as those which give little milk and are always fat and sleek.

Short-Horn breeders manifest a strong repugnance to having honest photographs taken of their animals, and the pictures which they allow to

be published of them are such wretched caricatures, as a general rule, that to give a fair picture of a Short-Horn cow, a copy has been made of an oil painting in possession of Mr. A. B. Allen of New-York, of "Duchess by Daisy Bull," the great granddam of all the Duchess family (fig. 435). Obviously a faithful portrait, it is almost a demonstration that in form her descendants, though selling for $30,000 or $40,000 apiece, do not surpass her.

DEVONS.—The cattle of the northern part of Devonshire, England, seem to be naturally thoroughbred—their origin veiled in obscurity, and their characteristics peculiar, and exceedingly fixed. Alloys of foreign blood seem to have little effect after a few generations, and they remain unchanged in general characteristics whether raised by skillful or unskillful breeders. They are of extraordinary beauty, great activity and vigor. In quality of beef they are superior to the Short-Horns. It is laid on also in the best places, so that being quick and kindly feeders, they are favorites in the market, and are, from their activity, much better adapted to the short, close pasturage of hilly and rough land, than are the heavier breeds. At the same time many excel as milkers, and when this quality is cultivated the returns of milk and butter are often extraordinary. When we consider in addition to their other good qualities that as working oxen they and their grades have no superiors, it is clear that the breed is one of very great value. It has, however, never received the same attention from breeders that the Short-Horn has, and perhaps, from its less size and slower maturity, does not merit it. It is difficult to see how it has been recently improved, or that its breeding has been more systematized or extended in this country. Pedigrees are kept carefully, and published in a herd-book, now some thirty years old, and it is only by applying to this breed the same systematic care and study of pedigree which the Short-Horns receive, that essential improvement can be expected. Fashion has a great deal to do with these things, and if Devons could become fashionable, too much could hardly be said in their favor, or too extravagant prices paid.

AYRSHIRES.—Within comparatively few years this breed has gained greatly in the dairy regions, especially where cheese factories abound. They are not less in favor with farmers near towns of moderate size where milk of fair quality is in demand. It is a comparatively modern breed, easily moulded to meet the breeders' notions, often showing diverse characteristics in different individuals ; for instance, a great variation in size and length of limb, but the cows are almost uniformly good, and frequently great milkers.

There have been Ayrshire herd-books for several years, and of late special efforts have been made to render pedigrees more accurate. It is fair to suppose also that they have been more carefully studied, and that systematic breeding is producing its legitimate results. As a rule, however, pedigrees are too short to enable us to judge of the success of

breeders. A large quantity of milk is a nearly uniform characteristic, and this is and has been assiduously cultivated. They frequently have enormous udders—too frequently diminutive teats. Their milk is of high average quality, but the globules very small and not high colored. It is, therefore, adapted to making cheese rather than butter, in which respect it is regarded as superior to any other breed.

As a breed the Ayrshires are constantly, though very gradually, improving. They are getting to have larger teats, more uniformity of size and color, and doubtless are more uniformly good milkers. They are hardy, milk fever, the scourge of the butter breeds, being less frequent among them, and they are generally good feeders, and fatten easily when dry. Extraordinary cows are not unfrequently found among their grades and crosses, and there is probably no surer way of producing a herd of deep and rich milkers than to infuse Ayrshire blood with that of the Channel Islands, the latter preponderating perhaps.

HEREFORDS.—This breed, with all its excellencies, has really made very little mark in this country, and is not likely to. The Short-Horn is its superior, taking size, beef, milk, and adaptation to the yoke, all into consideration. For, good as the Herefords are as flesh makers and as working oxen, they are small milkers, and they do not seem to have been on the whole attractive to our farmers.

CHANNEL ISLAND CATTLE.—The Channel Islands lie upon the coast of France, and possess two quite distinct breeds of cattle. Those of Guernsey and Alderney, the most northern of the group, are similar, while those of Jersey are, as a whole, quite distinct from the others, and though the cattle of Guernsey have, from time immemorial even down to the present, been more or less introduced into Jersey, it has had little effect upon the general characteristics of the cattle of that island, though it has undoubtedly improved their milk and butter qualities.

The name Alderney is rather indiscriminately applied to the cattle of the Channel Islands—that is, to Guernseys and to Jerseys, and especially to cross-bred animals of both Guernsey and Jersey blood; but breeders of either race are careful to distinguish between them. As now reared in this country and in England, and not less so upon the Islands, the two breeds have few points of resemblance, except the production of highly colored butter in good and sometimes in extraordinary quantity.

THE JERSEYS are below medium size, the cows weighing 650 to 900 pounds. They possess a peculiar delicacy and beauty of form, lightness of bone and limb, and a deer-like style, which is heightened in many cases by their colors, their large, full eyes, and the white fillet around the black muzzle. The udder is often of good size and form, and the teats of fair size, though exceptions are too frequent. Fashion dictates that Jerseys should possess little or no white; that they should not be black or red, and indicates a preference for solid colors, agreeably shading into darker and lighter upon different parts of the body. Distinct grey

in all shades, grey fawn, yellowish fawn, light brown, &c., are, in the order named, perhaps the most popular colors. Of course useful points are not influenced by color. In fact some cows of extraordinary excel-

Fig. 436.—*Jersey Bull Lawrence.*

lence have been or are of the most unfashionable colors. The pictures presented of Jerseys are from accurate photographs. The one of the bull Lawrence 61 (imported in 1868, by Thos. J. Hand), represents him at 3 years old, and is one of the best animal photographs ever taken, showing well both the bull and the possibilities of the art (fig. 436.) The portrait

Fig. 437.—*Jersey Cow Alphea.*

of the cow, (fig. 437,) from an almost equally good photograph, represents Alphea 171, in her old age; bred by Col. Hoe of Morrisania, N. Y., a noble cow, of a solid brown color, a great milker and butter yielder,

and a prolific breeder. Their portraits are in the Jersey Herd Register, and their descendants have been prevailingly like them in color and good qualities.

A good Jersey cow at five years old ought to produce her own weight of milk in a month, and this should yield one pound of butter to each fifteen pounds of milk. Not many will do better than this, but there are a few extraordinary exceptions, as indeed there are in all breeds. The butter, however, is of peculiar excellence, being high colored, very firm and granular, and easily worked free from buttermilk.

Two herd-books have been established. The older one fell into disfavor on account of statements that some pedigrees had been loosely inserted. In the other one, called "The Herd Register of the American Jersey Cattle Club," much pains has been taken to established an accurate registration of the name, color, date of birth, breeder, sire and dam of American bred animals—the same facts concerning the sires and dams being recorded elsewhere in the Register back to importation. It is not therefore a herd-book for recording pedigrees, but a collection of data from which pedigrees may be constructed. This is unfortunate, for the result is that few breeders of Jerseys either understand or make use of pedigrees as they should. The same thing is true of the manner of registering animals and the neglect of pedigrees on the Island of Jersey.

THE GUERNSEYS are a larger breed than the Jerseys, weighing 800 to 1200 pounds. Beef points and a tendency to fatten have been more cultivated in them. They have far less delicacy of bone and limb, larger heads, and are often coarse and large framed. They are however level, deep bodied, well formed beasts ; produce, as a rule, good sized calves ; give as much milk as the Jerseys in proportion to their weight, on an average, and this yields an equal quantity of intensely high-colored butter. The milk of one Guernsey cow will usually give a fair yellow color to the butter produced from five or six common ones, Devons, Short-Horns or Ayrshires. As bred in this country, preference is given to those of yellow and light fawn colors, combined more or less with white, with the fillet surrounding buff muzzles, the eyes also being encircled with buff ; although animals of other colors, but not inclining to grey or blue, are equally pure.

Guernseys are not so numerous in this country as the Jerseys, but they are favorites in every dairy to which they find their way, both on account of the quantitv and quality of their butter yield. A herd-book has been recently begun, to which pedigrees are being sent in, but of which no volume has as yet (1877) been published.

No one will claim that the Guernseys have been improved in this country. They have been bred here for a good many years, and their effect in improving our dairy herds is very marked. The influence of the bulls in imparting the quality of yielding yellow butter to grade cows is powerful, and on this account they are favorites, and in demand. While the butter

of the Jerseys generally becomes pale on hay, that of the Guernseys retains its color, or some color, much longer and better, and the same quality is found in the grades.

The engraving presented of a Guernsey cow (fig. 438) is from a photograph of a fine cow of Thomas M. Harvey of Chester County, Pa.

Fig. 438 —*Guernsey Cow Beauty.*

Dutch or Holstein Cattle.—Among cattle whose chief value is for milk and dairy products, the Dutch breed merits pre-eminence. For some centuries they have been bred in North Holland and Friesland both for quantity and quality of milk, and as those cows which were the heaviest yielded absolutely, though perhaps not proportionably, more milk, size has been valued, and the best bred animals, as a rule, have the greatest weight. They are fairly well shaped, mature rapidly, are hardy, good feeders, and make fair beef. They are black and white in color, rarely pure white, and, it is said, sometimes black. As milkers they yield milk of good quality, especially for cheese making, giving rarely less than sixteen, and often double that number of quarts daily. The milk, of course, varies in quality like that of all other races, but it is much better than would be supposed, from the fact that large cows seldom give the richest milk, for, as a rule, the smaller the breed the richer the milk.

Some twenty years ago, when the best bred and largest cattle of Holland were strangers to us, Mr. Chenery of Boston, visited that country and brought out a herd of the best which he could buy, and they proved of great excellence as milkers. In subsequent years some of the imported animals and their produce were sold at very high prices. Why they were called Holsteins was always a mystery, and many supposed that, as a thrifty merchant, the importer wished to establish a "trade mark" which would secure him in his monopoly, but this was probably a mistake. It is enough for us that the name was fixed upon them, and has been

generally accepted by breeders, who are now numerous. They may be imported direct from Holland at a cost of about $300 or $400. The number in the country is still quite limited, so that, except in the Eastern States, they are a curiosity at agricultural exhibitions. Yet, following the fashion of the times, and not without good reason, the breeders co-operated with Mr. Chenery in establishing a herd-book.

Fig. 439 —*Holstein Bull Rolf.*

The engraving of the Holstein bull "Rolf" (fig. 439) is a close copy of a fair photograph of the bull at two years old. He weighed about 1,600 pounds, and though with a little excess of dewlap, is a well shaped animal. However, in the Holsteins beef is only a secondary consideration, and compared with the Short-Horns, which they resemble in stature, they are often too coarse framed, and lack proper beef points.

Breeds of Sheep.

Important and valuable soever as sheep are, they occupy a decidedly secondary place in the agriculture of the Atlantic States and Mississippi valley. They are, however, relatively more important in California, where they are raised almost exclusively for their wool and increase. The total number of sheep given in the census of 1870 as existing in the whole country is 28,477,951. Thus it will be seen that they but little outnumber the neat cattle, while they might economically be nearly twice as numerous. The improvement in sheep culture in the past few years consists in the extensive dissemination of well bred rams of various breeds, which occurred in consequence of the high prices which prevailed during the war and immediately subsequent, and in consequence of the abundance of the circulating medium which was considered money.

When the markets are favorable, sheep offer three sources of profit to the breeder, namely, wool, early lambs and mutton. The lambs are important, not only as supplying the annual loss of the flock by slaughter and

through natural causes, but are of themselves a very considerable source of income, especially to breeders of the proper mutton breeds.

Sheep are naturally classified according to their wool, into Fine wools, Middle wools and Long wools.

The MERINOS, which trace their origin to the flocks of Spain, are the breeds most valued for fine wool. The French Merinos are a kindred breed improved by direct crossing with Spanish, and indirect crossing with the Saxony Merinos. The Saxony and Silesian Merinos are only carefully and peculiarly bred Spanish Merinos, upon which changes have gradually been wrought by a long course of careful breeding, which makes them quite distinct in appearance, while in the American Merinos the Spanish blood has likewise been kept nearly or quite pure, and yet the sheep have undergone essential modifications, being bred with somewhat different objects in view. They have been improved in form, and weight of fleece perhaps, but in fineness of fleece they have not kept up with the Merinos bred in Germanv and Silesia.

The Merinos are of only moderate size, noticeable for the ponderous horns of the rams, and for the great abundance of folds and wrinkles which the loose skin presents. They are remarkable also for the large quantity of "yolk"—a natural soap, called grease,—which exudes from the skin and fills the wool.

These sheep fatten rapidly, and are good mothers, and the cheaper ones, or grades, are valued by farmers living near good markets as breeders of early lambs, when crossed with rams of the mutton breeds.

The number of breeds of sheep is so great that it is hardly possible that any one has thorough knowledge of them all. In this country, fortunately, we have only those whose positive excellence recommends them.

MIDDLE WOOL SHEEP, so called, are all English breeds. Among them the *South-Downs* are pre-eminent, on account of their symmetry, their excellent, close, moderately fine, useful fleece, and their superior mutton. They are the best of the proper mutton breeds which are found in considerable numbers in this country. They are hornless, with grey faces and dark greyish legs, very broad in the loin, deep in the chest, thick through the heart, with wide saddles, wide and deep hams, small bones and little offal. They grow quickly, are fat at all ages, and are economical feeders. Other "Down" sheep are somewhat larger, or have been modified from this general type by crosses taken with some of the long wool breeds.

LONG WOOL SHEEP comprise a number of excellent breeds. The *Leicesters*, or Bakewells, the *Lincolns* and the *Cotswolds* are the most widely bred, and probably the latter are best adapted to our uses, being most uniform in character and best known. They are of the largest size, hornless, well formed as flesh producers, with small offal, hence with bones no heavier than necessary to support their great weight. Their wool is long, say 12 to 14 inches in length, very glossy and silky, but not fine as compared with the Merino, nor so fine as that of the intermediate Down

breeds. They grow with great rapidity, requiring, of course, abundant feed. The lambs are earliest in market, and bring the highest price. Long wool sheep require more careful attention than our Merinos have generally received, and the openness of the fleeces makes more shelter desirable for them. The wool has of late years been greatly in demand, and though the excessive prices no longer rule, yet important industries depend upon long or combing wool, which secure for it a ready sale.

Breeds of Swine.

The superior breeds of pigs all come from England, where they have had a comparatively short existence. Nevertheless the improvements in the various breeds were made there by introducing foreign blood, especially Chinese and Neapolitan, upon the long established and, in many respects, valuable breeds native to the country. This gives the modern breeds an antiquity which in some measure accounts for the permanence of the types.

The efforts to produce breeds of swine in this country have, so far, nearly failed, no doubt because the foundation we have to build upon is either a proper cross-breed or a mixture of breeds of no antiquity of breeding which would give permanence to the type when formed. We hear little now-a-days of any American breeds except the Chester Whites, and the Poland Chinas. These are neither of them fixed breeds, and would rapidly disappear were not great pains taken in their breeding.

The Chester Whites originated in Chester county, Pennsylvania, from successful crosses of the native mixed swine with imported English breeds. They are a long, rangy, rather coarse, well-haired breed, having thick shoulders, good hams, broad back and loins, and much side pork. They are healthy, good foragers, good breeders and great milkers. Some have large, leathery lop ears, others thin and lopping ears, while others have smaller erect ears, and there is a considerable diversity in size; some occasionally reaching the weight of 800 to 1000 pounds. They are favorites with the farmer, and have been so long bred with care in Chester County that their characteristics are tolerably fixed, so that they may be used to improve the common pigs.

The Poland Chinas are a composite breed of no-telling-what, with the Berkshires as a basis. They are very large in stature, of fair weight for their size, black—spotted or flecked with white. They have small heads, little offal, and are regarded as profitable feeders. They originated in Ohio, and have borne, and with many still bear, the name of their originator, Mr. Magie. There is an irrepressible tendency in the breed to revert towards one of its original factors, usually to the Berkshire, upon which breed it is an improvement only as grades and cross-breds are always an improvement upon established breeds, as they exhibit few faults and the merits of both parents intensified.

The Jefferson County Breed passes under various names, improved Cheshires, improved Yorkshires, etc. Some very large pigs, are

raised in Jefferson County, N. Y., from large white English pigs obtained in Canada. The breed is not properly established except as a cross breed of some merit. It is not at all likely that without occasional infusion of fresh blood they would be at all superior to the large Yorkshires which they resemble, except in being finer in bone and more delicate. They are very large, thin skinned, thin haired and small boned.

The BERKSHIRES are the most important of the English breeds for this country, being adapted to all parts of it, hardy and prolific, both at the North and extreme South, excellent foragers, and possessing an extraordinary aptitude to fatten, while their hams and shoulders are large in proportion. They are not so profitable feeders as some of the other breeds, or as their grades, and it is for the production of these that all the pure breeds are most valuable. It is doubtful whether the grades of any other breed will produce on the same feed an equal weight of pork, and certainly, if we regard the proportion which hams and shoulders bear to the rest of the animal, the quality will be superior.

The Berkshires are now bred with great particularity, black with more or less white on the face and chops, white feet and a white tip to the tail. White flecks occur naturally over the body, and being objected to, the best shaped pigs are not unfrequently absurdly sacrificed as breeders because of these markings. The occurrence of a brush of red hairs, is no indication of impurity of blood, for red occurred with the black and white in the ancient Berkshires, and occasionally crops out now-a-days. The skin varies in color from slaty to bluish black, with a shade of red—that which is preferred being a distinct plum color, readily recognizable.

SMALL BLACK BREEDS.—The Essex, of the small black breeds, is best known in this country—so much so, indeed that all well-bred pigs which are altogether black or bluish black, are called Essex. The breed is very high bred, with exceedingly small bones and little offal, short faces, thin, erect ears, long and round trunks, medium sized hams and shoulders, and possesses extraordinary aptitude to lay on fat, for the production of which—side pork and lard (by many regarded as the most important objects for which pigs are raised)—they have, it is probable, no superior. Their grades with good common stock are in these respects superior to the full bloods.

Other black breeds, Dorsets, Black Suffolks, &c., are very similar, and have made no special mark in this country.

SMALL WHITE BREEDS.—There are several of this group pretty well known in this country. They have been the subjects of more improvement than any other class of pigs in England of late years, and as a consequence slight variations have been seized upon to cultivate into fixed peculiarities.

The *Small Yorkshires* are probably best worthy of notice. They are small in stature, but long and very solid, weighing often 400 to 450 pounds when mature. They are bred with such exceedingly short faces that the

extreme length exceeds the length of the carcase measured from between the ears, by only two or three inches. There is very little offal; the hams and shoulders are large, side pork thick and solid, and leaf lard abundant and in short they combine porcine excellencies to an unusual degree, and lay claim, not without good show, to be the most economical feeders of all pigs, laying on flesh with the least consumption of food.

The Short-Faced Lancashires are a branch of the family, which has been somewhat cultivated in this country, and they possess its well known characteristics.

The Windsor or Prince Albert breed is closely related and quite similar. It comes from the Shaw Farm at Windsor. The pigs are generally not quite so short-faced, but otherwise, to an ordinary observer, are undistinguishable.

The Suffolks.—Under this name in this country several branches of the small white English pigs were rather indiscriminately grouped, and all possessed merit. They are classified with the Yorkshires, and the finer they are bred, the closer they approach them.

THE ENGLISH LARGE WHITE PIGS have been somewhat introduced into the United States and Canada. They are not as economical feeders as the small breeds. The largest are the *Large Yorkshires*, a breed of great size; rapid growers, and attaining a weight of 800 to 1,000 pounds at two or three years old.

NOTES ON FLORICULTURE.

COVERING HALF-TENDER PLANTS.—Many ornamental plants are hardy, and do not positively need covering for winter. But even these will bloom earlier and more profusely if they have some protection. Others require a cover to prevent injury or destruction. There are various modes of applying this protection. In dooryards and ornamental grounds nothing should be employed that will give a repulsive appearance. Whatever may be used, a neat trimming with evergreen branches on the top may be made to impart a positively ornamental effect. Plants which hold green leaves the winter through should not have much else than the evergreens, so that air may be freely admitted and decay prevented. Others, the roots of which only remain, such as the bulbs of hyacinths, may be covered with leaves or manure to any desired depth. If with leaves, the evergreens will hold them from blowing away; if with manure, they will veneer the surface. In order to do the work neatly, cut the branches all of the same length,

Fig. 440.

and begin by placing a circle outside with the tops all pointing inwards ; on these place another circular row, until all is finished, like the thatching of a straw roof, With a little care this work may be neatly done, with a pleasing effect, as imperfectly shown in the cut, fig. 440.

Farmers' Flower Beds.—There are few farmers who keep poultry shut up in pens or yards, for they can hardly afford to do so, as the fowls obtain most of their living on the premises by picking up scattered grain, seeds of weeds, insects and scattered kitchen crumbs. The result is that those members of the family who attempt to raise flowers in beds cut in the turf of the door-yard, are sometimes sadly annoyed by seeing their flower seeds and plants thrown out by scratching hens. To avoid this disaster they usually cover the whole of the beds for a time, or while freshly made, with unsightly brush, which not only disfigures their appearance, but impedes, deranges and entangles the plants as they advance in growth. A much neater, easier and more perfect way is to make a miniature circular hedge of small branches around the bed (fig. 441.) If the brush is spreading and well branched, a few will answer the purpose, as the hens will not attempt to pass through even a moderate barrier, and they will not go over it if only twenty inches high, unless they can alight on the top. Evergreen or leafless branches will do. If neatly done, it is an ornament rather than otherwise, and any bed may be protected by a few minutes' work.

Fig. 441.

Beds of Shrubbery.—The owners of small lawns and ornamental grounds are often puzzled to know the best way to treat small shrubs. If they plant them in grass, they grow feebly ; and they do not succeed much better with small circles dug about them. The best way is to allot to them certain distinct spaces, where they can be grouped together in mellow, cultivated beds, and then to adopt the mode which is described in a late number of the London Garden as having been employed in the gardens of the Thames embankment, the bare earth of the beds being hidden by mignonette, Virginian stock and other small annuals. These annuals operate, it is true, somewhat as weeds in reducing the vigor of the shrubs, but far less so than a grass surface. We have seen beautiful masses of petunias employed to clothe a bare surface with excellent effect.

Rose Slug.—The Gardener's Monthly recommends the following to destroy the rose slug : Add a teaspoonful of powdered white hellebore to two gallons of boiling water. Apply when cold, in a fine spray, bending the tops over so as to reach the under surface of the leaves. One application is usually sufficient. This is a good way to treat the currant worm.

THE FARMER'S REGISTER.

THE LISTS presented below are, as usual, made up from the advertising columns of THE COUNTRY GENTLEMAN, during the year preceding date of publication (Nov. 1, 1877,) and thus include the leading names in each department—those also most likely to be able to supply orders :

BREEDERS OF IMPROVED STOCK.

AYRSHIRE CATTLE.

Abbott, J J C..............Montreal, Can
Averill, L F...........Pomfret Centre, Ct
Ball, A P..................Derby Line, Vt
Barnes & Son, E H.........Milford, N Y
Benson, Burpee & Co.... Philadelphia, Pa
Brown, J Carter,.....East Greenwich, R I
Brown, Henry T..........Providence, R I
Casterline, J A.............. Dover, N J
Cloud, T A...........Kennett Square, Pa
Cochrane, M H............Compton, Can
Cochran, T A..............Baltimore, Md
Collins, Charles,..........Fellowship, N J
Community Farm,...........Oneida, N Y
Cooper, T S............. Coopersburg, Pa
Crozier, William,........ Northport, N Y
Curtis, F D................Charlton, N Y
Denny & Bailey,.......... Casadaga, N Y
Dimon, John,................ Putnam, Ct
Drew, L S...........South Burlington, Vt
Drew, L..............Hamilton, Scotland
Ely, L D., Jr.............Rochester, N Y
Fitch, Thomas,..........New-London, Ct
Freeman, J W................ Troy, N Y
French, J D W.....North Andover, Mass
Gibb John L..............Compton, Can
Gold, T S..............West Cornwall Ct
Guy, Thomas,......... Oshawa Ont., Can
Ham, E....................Verbank, N Y
Holden, J H.............. Belleville, Can
Hough, S D.............. Weatogue, Ct
Ireland, A..................Goshen, N Y
Kay, W F.................Montreal, Can
Kendall Farm,.............Woburn, Mass
King, W S.. ....Minneapolis, Minn
Leonard, R W..........New-Castle, N Y
Magone, D., Jr.........Ogdensburg, N Y
Merriam, Herbert,......... Weston, Mass
Miles, E T............. Fitchburgh Mass
Morris, F................Philadelphia, Pa
Norton, W C.............. Aldenville, Pa
Parry, William,........ Cinnaminson, N J
Peckham, C H........... Providence, R I
Phelps, W W..............Weatogue, Ct
Pullen, W..................Miamiville, O
Reeve, C..............Minneapolis, Minn
Robins, J N..............Northport, N Y
Rutherford, J T........Waddington, N Y
Stephenson, J B...... New Rochelle, N Y
Stewart & Son, H L...Middle Haddam, Ct
Sturtevant Brothers, S. Framingham, Mass
Van Waganen, J....... Lawyersville, N Y
Vaughan, W P..........Providence, R I
Wattles, W..................Sidney, N Y
Wells, S M & D......... Wethersfield, Ct
Whitney, N S..............Montreal, Can
Williams, E & J C........ Montclair, N J
Wotherspoon, I............Montreal, Can

DEVON CATTLE.

Arnold, W H................ Otego, N Y
Brown, J Carter,.....East Greenwich, R I
Brown, C.................Springhill, Tenn
Buckingham, J........... Zanesville, Ohio
Cole, Walter,............... Batavia, N Y
Dimon, John,.................Putnam, Ct
Howard, L R C............Zanesville, O
Longenecker, J B......Union Deposit, Pa
Morris, Dr. J C. ....West Chester, Pa
Peck, B F........... East Bethany, N Y
Rogers, D... .... North Cornwall, Ct

SWISS CATTLE.

Aldrich, D G...........Worcester, Mass

GUERNSEY CATTLE.

Beach, C M................ Hartford, Ct
Betts, S.................... Camden, N J
Brown, A T ....Boston, Mass
Bowditch, E F........ Framingham, Mass
Lawrence, Jas............. Groton Mass
Despard, H.............New-Castle, N Y
Malleson, C H... .... Hudson, N Y
Norton, Edw............ Farmington, Ct

HEREFORD CATTLE.

Aldrich, W W.................. Elyria, O
Clopper, F Y............ Greensburg, Pa
Stone, Fred. Wm...........Guelph, Can

HOLSTEIN OR DUTCH CATTLE.

Chenery, W L.............Belmont, Mass
Comer, J H............... Goshen, N Y
Ellis, J T.............. Flemington, N J
Hoffman, H C..........Horseheads, N Y
Houghton Farm,..............Putney, Vt
Johns, J..................Newcastle, Del
Miller, Gerritt S..........Peterboro, N Y
Oneida Community,.... .....Oneida, N Y
Smith & Powell,...........Syracuse, N Y
Tilton, W S...................Togus, Me
Wales, T B........ S. Framingham, Mass
Washburn E M.... Lenox Furnace, Mass
Whiting, T E............ Concord, Mass

JERSEY OR ALDERNEY CATTLE.

Agnew, Dr. C R.......... Palisades, N Y
Alexander, A J........ Spring Station, Ky
Alexander, Jos ....Chardon, O
Allinson, J................ Yardville, N J
Andrews, E S................ Orange, N J

Arnold, E J.........Bronte Lodge, Jersey
Barlow & Co., A G..North Ridgeway, N Y
Beekman, A S........ South Branch, N J
Betts, S....................Camden N J
Benson. Burpee & Co.....Philadelphia, Pa
Bolles, W W................ Toledo. O
Border-Bowen, H........... Bristol, R I
Bowditch, E F........ Framingham, Mass
Briggs, J B.............Russellville, Ky
Brown, C.............. Spring Hill, Tenn
Brown, J Carter,.....East Greenwich, R I
Brown, J F. .... Lunenburgh, Mass
Burden, J A & I T...... . ..Troy, N Y
Burns. W............Montreal. Que , Can
Cameron, Colin,.......... Brickerville. Pa
Camp. J F............... Apalachin, N Y
Chase & Co , E T..Deerfield Centre. N H
Churchman, F M....... Indianapolis, Ind
Clift, W.............. Mystic Bridge, Ct
Cloud, T A...........Kennett Square, Pa
Cochran, T A..............Baltimore, Md
Cooley, J G...........North Franklin. Ct
Crozier. William ....Northport, N Y
Curran H B............Whitestown, N Y
Despard, H.............New-Castle, N Y
Dinsmore. W B.........Staatsburgh, N Y
Earll, J H..............Skaneateles. N Y
Edgerton. James,.......... Barnesville. O
Farlee. G W............... Cresskill, N J
Fitch, Thomas, ...New London. Ct
Goodman, R................ Lenox. Mass
Griswold. E D.................Orwell. Vt
Gulick. W .... Princeton, N J
Hand, Thos. J............Sing Sing. N Y
Harris. G W........... Morrisania. N Y
Hayt, James A............Patterson. N Y
Herr. A G..............St. Matthews. Ky
Hoe, R M............ 31 Gold-St . N Y
Hoover, G M................ Bradford. O
Jackson. George......... Indianapolis, Ind
Jones, Mrs. E M....Brockville. Ont . Can
Juliand, Joseph..........Bainbridge, N Y
Kelsey, H C................Trenton N J
Lincoln, W S.............Worcester, Mass
Mackie, J M .....Great Barrington, Mass
McCready, W R............Saugatuck, Ct
Mead, H...........Golden's Bridge, N Y
Mills, Lyman A.............Middlefield. Ct
Montgomery, W B........Starkville, Miss
Morrell, R...............Manhasset, N Y
Newell, Dr. A D....New-Brunswick, N J
Osgood, H B...... ... Whitinsville. Mass
Owen, C H..................Buckland. Ct
Parke, H S................Bay Side, N Y
Parmly, Dr. E.............. Oceanic. N J
Patterson, R C............Patterson, N Y
Pennington, J C & D.......Paterson, N J
Quinby, G A............... .. Aldie, Va
Reeder. E.................New Hope. Pa
Reynolds, I W H......... Frankfort, Ky
Rieman Joseph H.........Baltimore Md
Roberts D G.............Pittsfield, Mass
Robins, J N.............Northport N Y
Rutherford. W L & W..Waddington N Y
Sargent, C S..............Brookline, Mass
Sharpless, Charles L... ..Philadelphia, Pa
Sharpless. Samuel J......Philadelphia Pa
Shaw, G J.................. Detroit, Me
Shields. H L..............Bennington. Vt
Skinner. W E............ Hamburg, N J
Smith. S B................. Roxbury, Ct
Starr. F R................ Litchfield Ct
Stephens. R H...St. Lamberts, P. Q., Can
Stockton. S W............Princeton. N J
Streeter C B............ Youngstown, O
Taylor, W S..............Burlington, N J
Taylor, C S..............Burlington, N J
Thorne. E................Millbrook. N Y
Tilton, W S.......................Togus, Me
Underhill A A........Poughkeepsie, N Y
War ng G E. Jr...........Newport, R I
Watrous. D W....51 Ferry-St., New-York
Weld M C.....................New-York
Wing John D...........Millbrook N Y
Woodruff,................. Terryville, Ct

NORFOLK RED POLLED CATTLE.

Taber, G F............... Patterson, N Y

SHORT-HORN CATTLE

Abbott, Joseph...........Bluff Point. N Y
Alexander, A J........ Spring Station, Ky
Allen. L F..................Buffalo. N Y
Avery & Murphy,...... Port Huron Mich
Ayres & McClintock...... Millersburg, Ky
Bailey, D R...... .... Baldwin, Wis
Ball A P.................Derby Line, Vt
Barbee, F J.....................Paris. Ky
Beattie. Simon. ....Annan, Scotland
Bedford. G M...................Paris, Ky
Bedford, E G................... Paris. Ky
Bellwood. John,...........Newcastle Can
Bethune. J N.............Warrenton, Va
Blanchard. W F............Manlius, N Y
Bowman. A M........... Waynesboro, Va
Briggs, J B...............Russellville, Ky
Brown's Sons, James N.........Berlin, Ill
Brown S S......................Galena, Ill
Bussing, D S..............Minaville, N Y
Butts. G.....................Manlius, N Y
Chase, W A................Groton, Mass
Christie. D.............. Paris. Ont.. Can
Cochrane, M H... .... Compton. Can
Cockrill, M S............ Nashville, Tenn
Coen P A................. Washburn, Ill
Collard, J..............Des Moines. Iowa
Combs, L., Jr.,............Lexington, Ky
Corbin, H.......................Paris. Ky
Cornell, Ezra, Estate of,......Ithaca. N Y
Cowan, J G....................Oregon, Mo
Cowan, J T............Cowan's Mills, Va
Craig, J R..................Edmonton, Can
Curtis, N M............Ogdensburg N Y
Davinport. A H........... Lexington. Ky
DeForest, J J...........Duanesburg, N Y
Dodge. William B..........Waukegan, Ill
Dun. John G.............. ....London. O
Dun, R G.. ....London, O
Frank & Son,......Cheltenham, Ont., Can
Fellows, B................. Clifton, N Y
Ficklin, S W.......... Charlottesville, Va
Foskett, G L................. Winsted, Ct
Galbraith. T .... Westport. Ct
Gibson, W H............ Litchfield, Minn
Gibson, R.................. London, Can
Goe. J S................. Brownsville, Pa
Goff, B P................ Winchester, Ky

Goodell D H..............Antrim, N H
Groom & Son, B B....... Winchester, Ky
Hall, James,.................. Paris, Ky
Hampton, A H..........Winchester, Ky
Harison, T L.............. Morley, N Y
Hayward, Stephen,....Cummington, Mass
Heacock, Seth,............Kettleby, Can
Hills, C..... .... Delaware, O
Hunter, J & R...............Alma, Can
Iles, Edward,............Springfield, Ill
Jones, T C.................. Delaware, O
Juliand, J..............Bainbridge, N Y
Ketchum, M................ Westport, Ct
King, Wm. S..........Minneapolis, Minn
King, A....................Malone N Y
Kinnaird, J G. ....Chilesburg, Ky
Kissinger, J H...........Clarksville, Mo
Latimer, J S................Abingdon, Ill
Lansing, C M......... Niagara, Ont., Can
Lowry, W................Pine Grove, Ky
Markham, W G...............Avon, N Y
Matthews, Claude,.......... Clinton Ind
Maxon, G G.. ....Schenectady, N Y
McKeen, T L.... ... ... Easton, Pa
Meredith & Son, S ...Cambridge City, Ind
Miller, George, ...Markham, Can
Miller, John,.............Brougham, Can
Miller, Robert, ...Pickering, Can
Milne, Robert, ...Lockport, Ill
Murray, George,......... .. Racine, Wis
Neely, W J............. ... Ottawa, Ill
Otley, R............. ...... Kewanee, Ill
Page, John R.......... ....Sennett, N Y
Parsons, C., Jr............Conway, Mass
Patterson, N..................... Paris, Ky
Patterson, J L..................Paris, Ky
Patterson, S T..................Paris, Ky
Pickrell, J H... ....Harristown, Ill
Porter & Son, J D........... Alexis, Ill
Prewitt, J W.. .... Winchester, Ky
Prewitt R H.............Pine Grove, Ky
Pullen, W...................Miamiville, O
Redmon, C T & S B..... Winchester, Ky
Reid, W B......... ....West Chester, Pa
Richardson, W H.........Lexington, Ky
Rolph, W., Jr...... Markham, Ont., Can
Russell, J...... Richmond Hill, Ont., Can
Sanborn, J P...........Port Huron, Mich
Schnebly, L R..............Fairview Md
Scott & Co., Joseph,............Paris, Ky
Sherman, H B.............. Burnett Wis
Skinner, W E........... Hamburgh, N J
Smith, B W.............. Lexington, Ky
Snell John's Sons, ...Edmonton, Can
Spear & Son, J H........... Tallula, Ill
Sprague, G............ Des Moines, Iowa
Stone F W...... .. ..Guelph, Can
Streator, S R...........East Cleveland, O
Sudduth, W L. ....Winchester, Ky
Talcott & Sons, J.............Rome N Y
Talbott, Thomas E.......... Dalhoff, Mo
Taylor, C S..............Burlington, N J
Taylor John B..... ...... London, Can
Terrill, M W......... ... Middlefield Ct
Thornton, J C........ ... .. Avonia, Pa
Van Meter, B F & A..... Winchester, Ky
Van Meter, I C.... ....Lexington, Ky
Van Meter, W C.........Winchester, Ky
Van Meter, J M............. Midway, Ky
Wadsworth, Charles F......Geneseo, N Y
Warfield, William,......... Lexington, Ky
Warnock, W .... Cynthiana, Ky
Wentworth, John,............ Summit, Ill
Wood, Charles,............... Baden, Mo

Horses.

Alexander, A J........ Spring Station, Ky
Backman, Charles,.......... Goshen, N Y
Baker & Harrigan,Comstock's Landing, N Y
Baird, D.........Springfield Centre, N Y
Battell, R.................... Norfolk Ct
Beekman, A S........ South Branch, N J
Brown, C.............. Spring Hill, Tenn
Brown, J Carter,.....East Greenwich, R I
Chapin, J H............... Hoosac, N Y
Chenery, W L............Belmont, Mass
Clark, Leander........... Newburgh, N Y
Cochrane, M H............Compton, Can
Crozier, William,.........Northport, N Y
Dimon, J.....................Putnam, Ct
Dorsey, L L............... Louisville, Ky
Drew, L.............Hamilton, Scotland
Dun, J G...................... London O
Ficklin, S W..........Charlottesville, Va
Fitch, Thomas,..........New-London, Ct
Fullington & Co., James...Irwin Station, O
Goe, J S..................Brownsville, Pa
Gibb, J L......... Compton, P Q., Can
Gibson, T.............Spring Hill, Tenn
Harison, T L................Morley, N Y
Helm, H T.............. Lake Forest, Ill
Herr, A G.............St. Matthews, Ky
Herr, L..................... Lexington, Ky
Howard, L R C............Zanesville, O
Jewett, G M............... Zanesville, O
Johnson, J P...........Spring Hill, Tenn
Juliand, Joseph..........Bainbridge, N Y
Kay, W F.................Montreal, Can
Kellogg P C......110 John-St., New-York
Long, Wm...........Lansing, Ont., Can
Mali, H W T.......... Stockbridge, Mass
Mason, F A...................Putnam, O
McKeen & Hulick,............Easton, Pa
Meikle, W ....Pendleton, Ind
Miller, George,......Markham Ont., Can
Moore John,...Comstock's Landing, N Y
Osborne W F...............Ansonia, Ct
Parker, J J.,..............West Chester, Pa
Peck, W H..................Hartford, Ct
Penistan, R................ Lexington, Ky
Pine, J K P.....................Troy, N Y
Reynolds, I W H......... Frankfort, Ky
Russell, H S................Milton, Mass
Shaw, G J.................... Detroit, Me
Sherman, H B............. Burnett, Wis
Shields, H L..............Bennington, Vt
Smith & Powell,...........Syracuse, N Y
Stephens, Sheldon,.........Montreal, Can
Stevens, George C........Milwaukee, Wis
Stone, F W.................. Guelph, Can
Swigert, D.. .... Spring Station, Ky
Thorne, Edwin, ...Millbrook, N Y

Shetland Ponies.

Alexander, A J........ Spring Station, Ky
Allan, J S...................Montreal, Can

Cameron, C..............Brickerville. Pa
Cochrane, M H... ....Compton, Can
Reesor & Co., R.....Markham, Ont., Can
Swigert, D........... Spring Station, Ky

COTSWOLD SHEEP.

Abbott, J J C.............Montreal, Can
Aldrich, D G...... .. .. Worcester, Mass
Allen, W C................ Buffalo, N Y
Appleton, D F............Ipswich, Mass
Barbee, W H........... Georgetown, Ky
Bedford, G M.................Paris, Ky
Birrell & Johnston,..Greenwood, Ont., Can
Briggs, J B..............Russellville, Ky
Burroughs, H K....... ... Roxbury, N Y
Community Farm,..........Oneida, N Y
Cooper, T S............ Coopersburg, Pa
Craig, J R...............Edmonton, Can
Crozier. William,........ Northport, N Y
Deuel, S T............. Little Rest, N Y
Frank & Son, A....Cheltenham, Ont., Can
Garne, R.......... ..Aldsworth, England
Gibb John L .... Compton, Can
Harris, Joseph,...........Rochester, N Y
Heacock & Son, S.... Kettleby, Ont., Can
Hills, C.................... Delaware, O
Ingersoll, George,........Charleston, N Y
King, W S............Minneapolis, Minn
Lane, Wm..........Northleach. England
Lemon, H........... Thornhill, Ont., Can
Mattocks, C P. ....Portland, Me
Maxon, J J.................Gallipolis O
Miller, George,.......Markham, Ont., Can
Miller, W M........Claremont, Ont., Can
Morris, Francis,..........Philadelphia, Pa
Morris, J C............West Chester. Pa
Robins, J N.............Northport, N Y
Rolph, W Jr........ Markham, Ont., Can
Russell J...... Richmond Hill, Ont., Can
Sayre & Son, Cooper, Oak's Corners, N Y
Sedgwick, H.........Cornwall Hollow, Ct
Shoemaker, S M..........Baltimore, Md
Smith S B................ Roxbury, Ct
Smith, W C ...New-Hamburgh, Ont., Can
Snell John's Sons,.. .....Edmonton, Can
Stone. Fred. Wm.... .... Guelph. Can
Swanwick, R........ Cirencester, England
Taylor, C S............. Burlington, N J
Terrill, M W..... ....Middlefield, Ct
Thornton, J C............... Avonia, Pa
Van Waganen, J....... Lawyersville, N Y
Ward, C K.................LeRoy. N Y
Wilder, J B...............Louisville Ky

LEICESTER SHEEP.

Drevar, Dr. A.............Annapolis, Md
Ingersoll, George,........Charleston, N Y
Magone, D.. Jr.........Ogdensburg, N Y
Meredith & Son, S....Cambridge City, Ind
Rutherford, W L & W..Waddington, N Y
Snell, John's Sons,........Edmonton, Can
Thornton, J C............... Avonia, Pa
Walsh, T..................Alexandria, Va

LINCOLN SHEEP.

Gibson, R..................London, Can
King, W S........... Minneapolis. Minn
LeClair, Peter,.............Winooski. Vt
Reeve, C..............Minneapolis, Minn

MERINO SHEEP.

Brunson & Mariner,....East Bethany, N Y
Chamberlain, Wm. L.... Red Hook, N Y
Cole, Walter,............... Batavia, N Y
Cowles, C P...............Syracuse, N Y
Earll, J H............. Skaneateles, N Y
Gibbs, M F............... Livonia, N Y
Goe, J S......... ....Brownsville, Pa
Joslin, J O...............Tiashoke, N Y
Markham, W G..............Avon, N Y
Peck, B F............East Bethany, N Y

SHROPSHIRE-DOWN SHEEP.

Cochrane, M H...........Compton, Can

SOUTH-DOWN SHEEP.

Aldrich, D G........... Worcester, Mass
Alexander, A J........ Spring Station, Ky
Allen, T.................Pittsfield Mass
Allinson, J............... Yardville, N J
Benson, Burpee & Co.....Philadelphia. Pa
Bowman, A M.......... Waynesboro, Va
Cameron, C...............Brickerville, Pa
Cooper, T S............ Coopersburg, Pa
Crozier, William,......... Northport, N Y
Dun, John G.................London. O
Frank & Son, A...Cheltenham, Ont., Can
Gibson, R................. London, Can
Harison, T L.............. Morley, N Y
Heacock & Son, S....Kettleby. Ont., Can
Holly, J I................Plainfield, N J
Hulse, B................ Allentown, N J
Jones, T C................. Delaware, O
Marsh, R...... Richmond Hill, Ont., Can
Morris, Francis,......... Philadelphia, Pa
Pettit C.... ....Salem, N J
Reeder, E................New-Hope, Pa
Reynolds, I W H.......... Frankfort, Ky
Sharpless, Samuel J......Philadelphia. Pa
Stone, Fred. Wm........... Guelph, Can
Thornton, J C............... Avonia. Pa
Wentworth, John,............Chicago, Ill
Wing, John D...........Millbrook, N Y
Wood, Thomas,.............Doe Run, Pa
Woods, H.... .... Merton, England

OXFORD-DOWN SHEEP.

Kelsey, H C................Newton, N J
Cooper, T S............. Coopersburg, Pa

BERKSHIRE SWINE.

Allen, W C..................Buffalo, N Y
Allinson, J. ....Yardville N J
Ball, A P................Derby Line, Vt
Balderston, E............. Morrisville. Pa
Barbee, G L............ Georgetown, Ky
Barbee, W H............ Georgetown, Ky
Barlow & Co., A G..North Ridgeway, N Y
Barney & Sons, E H........Milford, N Y
Beckett & Co., R S.........Millville. N J
Benson, Burpee & Co.... Philadelphia, Pa
Birrell & Johnston,..Greenwood, Ont.. Can
Bowman, A M.......... Waynesboro, Va
Brown, J Carter,.....East Greenwich, R I
Brugler, J M.................Hope, N J
Burroughs, H K...........Roxbury N Y
Campbell, A G............St Hilaire, Can
Cochrane, M H............Compton, Can
Cooper, T S............. Coopersburg, Pa
Craig, J R............... Edmonton, Can

Breed, J H ... Hatfield, Mass
Cameron, C ... Brickerville, Pa
Cochran, T A ... Baltimore, Md
Crozier, William, ... Northport, N Y
Curtis, F D ... Charlton, N Y
Drevar, Dr. A ... Annapolis, Md
Deuel, S T ... Little Rest, N Y
Ely, L D ... Rochester, N Y
Ewing, J H ... Villa Nova, Pa
Fellows, B ... Clifton, N Y
Finch, M P ... Otego, N Y
Freeman, J W ... Troy, N Y
Fulford, A M ... Bel Air, Md
Gibb J L ... Compton, Can
Gorsuch, T T ... Glencoe, Md
Goodell, D H ... Antrim, N H
Graves, A H ... Hatfield, Mass
Groff, A E ... Pikesville, Md
Hale W A ... Sherbrooke, Can
Harlow, R A ... Springfield, Ill
Hayward Bros ... Bridgewater, Mass
Heacock & Son, S ... Kettleby, Ont., Can
Hills, C ... Delaware, O
Hoe, R M ... Mott Haven N Y
Hoffman, E L ... Mill Creek, West Va
Jackson, Geo ... Indianapolis, Ind
John, J F ... Selma, Ala
Johnson, J ... Vincent, Pa
Johnson, R P ... Springfield, Ill
Johnston, B H ... Alexandria, Va
Jones, H B ... Dexter, Mich
Jones, T C ... Delaware, O
Juliand, J ... Bainbridge, N Y
Kay, W F ... Montreal, Can
Kelsey, H C ... Newton, N J
King, W S ... Minneapolis, Minn
Lehman, H F ... Hagerstown, Md
Lewis, D McA ... Lorton Valley, Va
Longenecker, J B ... Union Deposit, Pa
Lovejoy, A J ... Roscoe, Ill
Mattocks, C P ... Portland, Me
McNish, W H ... Lyn, Ont., Can
Mead, H ... Golden's Bridge, N Y
Miller, George, ... Markham, Ont., Can
Miller, W M ... Claremont, Ont., Can
Merriam, H ... Weston, Mass
Morris, Francis, ... Philadelphia, Pa
Morris, J C ... West Chester, Pa
Moseley & Stoddard, ... Poultney, Vt
Norton, W C ... Aldenville, Pa
Onderdonk, A S ... Eagle Harbor, N Y
Otis, S G ... Hallowell, Me
Peck, B F ... East Bethany, N Y
Pickrell, J H ... Harristown, Ill
Pullen, W ... Miamiville, O
Reeve, C ... Minneapolis, Minn
Rhodes, T F ... Camillus, N Y
Riddle, F ... Big Bend, Pa
Roach, John, ... Toronto, Can
Robins, J N ... Northport, N Y
Schnebly, M N ... Fairview, Md
Sedgwick, H ... Cornwall Hollow, Ct
Sherman, H B ... Burnett, Wis
Snell, John's Sons, ... Edmonton, Can
Stone, F W ... Guelph, Can
Stuyvesant, J R ... Poughkeepsie, N Y
Swanwick, R ... Cirencester, England
Talcott, Jona, ... Rome, N Y
Taylor, C S ... Burlington, N J
Terrill, M W ... Middlefield, Ct
Thorne, Edwin, ... Millbrook, N Y
Thornton, J C ... Avonia, Pa
Tilton, W S ... Augusta, Me
Underhill A A ... Poughkeepsie, N Y
Van Waganen, J ... Lawyersville, N Y
Walling, A J ... New-Ohio, N Y
White, B F ... Ashley Falls, Mass
Woods, J R ... Ivy Depot, Va
Zeller, B S ... Hagerstown, Md

Cheshire Swine.

Allen, T ... Pittsfield, Mass
Bacheldor, J M ... Pownall, Vt
Cranston, H S ... Oneida Castle, N Y
DeForest, J J ... Duanesburg, N Y
Green, D ... Belleville, N Y

Chester County Swine.

Benson, Burpee & Co ... Philadelphia, Pa
Cloud & Sons, Jas ... Kennett Square, Pa
Cloud, T A ... Kennett Square, Pa
Cochran, T A ... Baltimore, Md
Earll, J H ... Skaneateles, N Y
Edgerton, James, ... Barnesville, O
Ficklin, S W ... Charlottesville, Va
Graves, A H ... Hatfield, Mass
Horton C C & E W ... Muscatine, Iowa
Morris, F ... Philadelphia, Pa
Roberts, J C ... West Chester, Pa
Sharpless, T ... Street Road, Pa
Todd, S H ... Wakeman, O
Wood & Son, T ... Doe Run, Pa
Worth, F ... Marshallton, Pa
Young & Co., James, Jr. ... Marshallton, Pa

Essex Swine.

Bowditch, E F ... Framingham, Mass
Cobb, J ... Beloit, Wis
Farlee, G W ... Cresskill, N J
Graves, A H ... Hatfield, Mass
Gutchess, O ... Port Byron, N Y
Harris, Joseph, ... Rochester, N Y
Hooker, H E ... Rochester, N Y
Hulse, B ... Allentown, N J
McCready, W R ... Saugatuck, Ct
Riddle, F ... Big Bend, Pa
Sherman, F ... Vienna, Va
Wheeler, M I ... Great Barrington, Mass
White, B F ... Ashley Falls, Mass

Jersey Red Swine.

Dimon, J ... Putnam, Ct
Holmes, W M ... Greenwich, N Y
Pettit, C ... Salem, N J

Poland China Swine.

Austin, H W ... Woodstown, N J
Andrews, E S ... Orange, N J
Beekman, A S ... South Branch, N J
Bellis, D ... Ringoes, N J
Benson, Burpee & Co ... Philadelphia, Pa
Camp, J F ... Apalachin, N Y
Catlin, G L ... Owego, N Y
Cowles, C P ... Syracuse, N Y
Ellwood, Dr. L ... Schenectady, N Y
Gray, C K ... East Montpelier, Vt
Holman, S ... Somerville, N J
John, J F ... Selma, Ala

Jones, J W.........Chatham Village, N Y
Johnson, G B.............Brewerton, N Y
Lippincott, James,........ Mt. Holly, N J
Magie, D M.................... Oxford, O
Maxon, J J.. ....Gallipolis. O
Newell, Dr. A D....New-Brunswick, N J
Paulding, Dr. M J........ Daretown, N J
Pettit, F......................Salem, N J

SUFFOLK SWINE.

Benson, Burpee & Co.... Philadelphia, Pa
Clark, D M.....................Elyria, O
Frank & Son, A...Cheltenham, Ont., Can
Harison, T L............... Morley, N Y
Jones, H B. ....Dexter. Mich
Magone, D., Jr.........Ogdensburg, N Y
Matthewson, H M......Stayner, Ont. Can
Wentworth, John,............ Chicago, Ill

YORKSHIRE SWINE.

Breed, J H................Hatfield, Mass
Chandler, J K............Boscawen, N H
Cole, W H..................Clinton, N J
Hoe, R M.............. Morrisania, N Y
Lawson, Dr. G...... Halifax, Nova Scotia
Maxon, J J..................Gallipolis, O
Mead, H.. ....Golden's Bridge, N Y
Merriam, H................Weston, Mass
Snelling, H..........South Lincoln Mass
Stone, F W...... ....Guelph, Can

POULTRY FANCIERS.

Acton, C B................. Salem, N J
Barney, E H............... Milford, N Y
Bates, C...........Richfield Springs, N Y
Beebe, J M............. Cassadaga, N Y
Beekman, A S..... ...South Branch, N J
Beer, T C..................... Bucyrus, O
Benson, Burpee & Co. .. Philadelphia, Pa
Birnie, A......... .... Holyoke, Mass
Bliss, O S...... .... Georgia, Vt
Bond, D.. ....Brownsville, Tenn
Breese H G............... Hoosick. N Y
Burnham, G P..... ....Melrose, Mass
Campbell, A G............St. Hilaire, Can
Chapin, G W............ Providence, R I
Clark, D M..................... Elyria, O
Craft, G N................ Franklin. Pa
Clift, Wm.. ... .Mystic Bridge, Ct
Cooper, T S............. Coopersburg, Pa
Cowles, C P..............Syracuse, N Y
Cox, E C. .. .. Kennett Square. Pa
Crozier, William,........ Northport, N Y
Day, C J.................Dunellen, N J
DeForest, J J......... Duanesburgh, N Y
Dickie, Dr. A M..........Doylestown, Pa
Dunbar, E B.................... Bristol, Ct
Earll, J H.. ....Skaneateles, N Y
Edgar, J B...................Rahway, N J
Elben, C B .... Pittsburgh. Pa
Ely, L D., Jr.............Rochester, N Y
England, T Y................... Berlin, N J
Evans, J..............Schaghticoke, N Y
Fassett, E.................... Forkston. Pa
Fowler, W W........ West Haven, Conn
Frizzell, A W..............Pikesville. Md
Frost, G M................Watertown Ct
Gibson, R.................... London. Can
Gilman, V C.............. Nashua, N H
Goodell D H........... ... Antrim, N H
Gregg. O......... .. Washingtonville, N Y
Haines, R H .. . .Malden, N Y
Hasbrouck, B & V.... South Orange, N J
Hasbrouck. O., Jr.......... Modena. N Y
Hawkins, C F...... .... Goshen, N Y
Hayt, James A......... ..Patterson, N Y
Hayward, C E L......... Peterboro. N H
Higgins J C..........Delaware City, Del
Hills, W R. .... Albany, N Y
Hoffman, E L....... Mill Creek. West Va
Hooff, L...... .... Alexandria, Va
Holcombe, P Q. .... Reaville, N J
Holly, J A...... .... Greenville N Y
Holmes, Harry,.......... Greenwich, N Y
Horne, W... .... Janesville, Wis
Hough, S D.............. Weatogue, Ct
Hulse, B..... .... Allentown, N J
Hults, J B................... Girard. O
Humphrey, A B........Weavertown. N Y
Hunt, W.................North East. Md
Ives, John S............... Salem, Mass
Jackson, G..............Indianapolis, Ind
Josselyn, G.................Fredonia, N Y
Judd, J W............... Orange. N J
Juliand, Jos............. Bainbridge, N Y
Kellogg, F N..............Sheffield, Mass
Kelsey, H C.... . ...Newton, N J
Lewis, D McA......... Lorton Valley, Va
Lewis. R.. ....Castleton, N Y
Long, J C., Jr... .. ....Philadelphia, Pa
Magone, D., Jr.,...... Ogdensburgh, N Y
Maguire, M B..........Westchester, N Y
Merriam, H...............Weston, Mass
Mattocks, C P.............. Portland. Me
Maxon, J J...................Gallipolis, O
McKeen, T L. ....Easton, Pa
McKinstry, A W......... Chicopee, Mass
Morrell, R..............Manhasset. N Y
Mullin, A F........Mt. Holly Springs, Pa
Newell, Dr A D.... New-Brunswick, N J
Osborne, W F..................Ansonia, Ct
Osgoodby, J H............ Pittsford, N Y
Parker, J J........ .... West Chester, Pa
Parker. S J............. West Chester. Pa
Pennell, E.......................Chester, Pa
Pennington. J C & D... ...Paterson, N J
Perkins, R W.............. Oxford. N Y
Phillips, J H............ Coventry, N Y
Potter, M..........Onondaga Valley, N Y
Reeve, C.............. Minneapolis, Minn
Reihl, E A......................... Alton. Ill
Rhodes, H A........East Greenwich, R I
Rice, J L............Rensselaerville, N Y
Riddle. F .... Big Bend, Pa
Roberts. J A.......................Paoli, Pa
Robinson, J A..............Litchfield, Ct
Rutherford, W L & W. Waddington, N Y
Sanderson, J P ....Arlington, Md
Shaffer, J H................Macungie, Pa
Sharpless C L...........Philadelphia, Pa
Sherman. F.....................Vienna Va
Sherman, H B............ Burnett, Wis
Smith C.............. Mystic Bridge, Ct
Stevens, C B & C O........Vergennes. Vt
Taber, W F...........Poughkeepsie, N Y
Taylor, C S...............Burlington, N J
Terrill, M W...... .. ... Middlefield. Ct
Thornton, J C................ Avonia, Pa

Thompson, F N..........Southboro, Mass
Underwood, H J & W H.... Homer, N Y
Vanderveer, G. ..... Port Jac-son N Y
Warner, G H...... New-York Mills. N Y
Webster, C F.............. Girard. Pa
Weld. M C......... .... Closter, N J
Wells, C H.........East Windsor Hill, Ct
Wentworth, John,............ Chicago. Ill
Wheaton Brothers,........ ....Zoar, Mass
Wood, B L................. Doe Run, Pa
Wotherspoon, I............ Montreal, Can

BEES.

Root, L C........... St. Johnsville, N Y

ANGORA GOATS.

Goe, J S.................. Brownsville, Pa

FISH AND SPAWN.

Clift, W............ ...Mystic Bridge, Ct

FERRETS.

Johnson, J................Hartland, Wis
Osgoodby, J H......... ...Pittsford, N Y

DOGS.

Allan, J S.. .... Montreal, Can
Abbott, W.. .... Montreal, Can
Benson, Burpee & Co.....Philadelphia, Pa
Burns, Wm ....Montreal, Can
Campbell, A G...St. Hilaire, Quebec, Can
Crozier. William,......... Northport, N Y
Hulse, Benj...............Allentown. N J
Juliand. Joseph, ... Bainbridge, N Y
Kittredge, J. ....Taunton. Mass
Lehman, H F........... Hagerstown, Md
Long, J C... .... Philadelphia, Pa
Mead, H........... Golden's Bridge. N Y
Morris, F................Philadelphia, Pa
Mullin, A F........Mt. Holly Springs, Pa
Robbins, E J............ Wethersfield, Ct
Taylor, W S............. Burlington, N J
Watrous, D W................ New-York
White, B F............Ashley Falls, Mass

DEER.

Mattocks, C P.............Portland, Me

HORTICULTURAL AND SEED REGISTER.

NURSERIES.

Adair, William,.............Detroit, Mich
Adams, J W........... Springfield, Mass
Allen, Edwin,........New-Brunswick, N J
Achelis, G...... .... West Chester, Pa
Baird, D.... .... Manalapan, N J
Balderston, George,...... ....Colora. Md
Battles, A...................... Girard, Pa
Benton, D C.. ....Quincy, Ill
Biddle, F C....... ... Chaddsford, Pa
Buist, R ....Darby Road, Philadelphia
Burrow. Wood & Co........Fishkill, N Y
Chase & Co., R G.......... Geneva, N Y
Dann, C H................ Warsaw, N Y
Davis & Co., F.............Richmond Va
Douglas & Sons,... ....Waukegan Ill
Draper, James, ...Worcester, Mass
Edgerton, J .... Barnesville, O
Edwards, S., Jr.,......... LaMoille. Ill
Ellwanger & Barry,.... ..Rochester, N Y
Ferris, W L., Jr. & Co., Poughkeepsie, N Y
Frost & Co.......... ... Rochester, N Y
Foster. Suel,..... ....Muscatine, Iowa
Grieves, J.................Patterson, N J
Hammond, A.............. Geneva, N Y
Hance & Son, A.... .....Red Bank, N J
Hanford, R G........... .. Columbus, O
Harrington, E W.......... Palmyra, N Y
Heikes, W F.. ....Dayton. O
Hooker & Bro., H E .....Rochester. N Y
Hoopes Bro. & Thomas, West Chester. Pa
Hovey & Co... ....Boston, Mass
Hoyt & Sons, S..........New-Caanan. Ct
Johnson, W W........Central Lake. Mich
Jones, H T ....Rochester, N Y
Jones & Palmer,..........Rochester, N Y
King & Murray.......... .Flushing, N Y
Little, W S.......... ....Rochester, N Y
Maxwell & Bros., T C...... Geneva, N Y
McKelvie. W G.............Geneva, N Y
Meehan, Thomas,........Germantown, Pa
Moody & Sons, E......... Lockport. N Y
Moon, W H.............. Morrisville, Pa
Ohmer, N....................Dayton, O
Parry, William, ... Cinnaminson, N J
Parsons & Co., R B..... ..Flushing, N Y
Parsons & Co., S B.........Flushing N Y
Pearson, W L...... ...Schenectady, N Y
Peirson, E C..............Waterloo, N Y
Peters, C P ....Concordville. Pa
Peters, Randolph,........Wilmington, Del
Phœnix, F K .... Bloomington. Ill
Pottle, W L.................Naples, N Y
Pullen, T J..............Hightstown, N J
Purdy & Johnston........ Rochester, N Y
Rakestraw & Pyle, ...Willowdale, Pa
Richardson & Kelsey,........Geneva, N Y
Richardson & Nicholas,..... Geneva, N Y
Riehl, E A. .... Alton, Ill
Roberts, Josiah A....... ... Malvern. Pa
Root, James A..........Skaneateles, N Y
Saul, John.. ....Washington, D C
Simpson, J H. ....Vincennes, Ind
Smith, W & T..............Geneva. N Y
Smith & Powell,...........Syracuse, N Y
Storrs, Harrison & Co...... Painesville, O
Strong & Co., W C........Brighton, Mass
Sylvester E Ware,........... Lyons, N Y
Tassell, G W...................Marion, O
Teas, E Y.... .. .. Dunreith, Ind
Thompson, G W......... .. Stelton, N J
Watson, B M............ Plymouth, Mass
Weltz, L...................Wilmington O
Will, W F.. .... Fayetteville, N Y
Yeomans, T G...........Walworth, N Y

SMALL FRUITS AND GRAPES.

Allen, E E...........Northampton, Mass
Allen, S L...... . ....Cinnaminson, N J
Allis, S J............... ... . Erie. Pa
Babcock, I H.............Lockport, N Y
Bateham, M B............ Painesville, O
Batterson, N D..............Buffalo, N Y
Bennett, W...................Hamilton, O
Biddle, F C............ Chadd's Ford, Pa
Breese, H G............... Hoosick, N Y

Briggs, I W......... West Macedon, N Y
Brown & Sons, D H., New-Brunswick, N J
Burgess, Edward,..... Poughkeepsie, N Y
Burgess. Thomas H.. .....Highland, N Y
Campbell, G W.. .. .. Delaware. O
Clark, B W...... .... Lockport, N Y
Community Farm,..........Oneida, N Y
Collins, John S.........Moorestown, N J
DeCou, S C............ Moorestown, N J
Dingwall, John,. ....Albany, N Y
Draper, James, ...Worcester, Mass
Durand, E W...............Newark, N J
Ellwanger & Barry,.......Rochester, N Y
Ferris, W L., Jr. & Co.,Poughkeepsie, N Y
Griffith, Wm................Northeast, Pa
Haines, R H...............Malden, N Y
Hale Bros.........South Glastonbury, Ct
Hanford, R G.......... ... Columbus, O
Hanford & Co................Bristol, Ind
Hendricks, H............ Kingston, N Y
Hexamer, F M..........New-Castle, N Y
Hoag & Clark,............ Lockport, N Y
Hubbard. T S............ Fredonia, N Y
Hunt, W M...............Waterloo, N Y
Leech, M W............Fayetteville, N Y
Low, E E..........East New-Market, Md
Miller, Amos,................ Carlisle, Pa
Miner, T B.. ....Linden, N J
Moon, W H.......... ....Morrisville, Pa
Parry, William,.. ..... Cinnaminson, N J
Parsons & Co., R B... .. Flushing, N Y
Patterson, J S..... .... Berlin Heights, O
Perry & Robinson,.........Syracuse, N Y
Pierson, F R.............Tarrytown, N Y
Potter & Co., E J......Knowlesville, N Y
Purdy & Hance,.........South Bend, Ind
Quinn, P T.................Newark, N J
Reihl, E A..................... Alton, Ill
Ringueberg & Son, N S....Lockport, N Y
Robinson, E D........ Howlett Hill, N Y
Roe, E P...Cornwall-on-the-Hudson, N Y
Schroeder. Dr. H........ Bloomington, Ill
Smith, H H............ West Haven, Ct
Stokes, E.................... Berlin, N J
Strong, W C..............Brighton, Mass
Sylvester, E W...............Lyons, N Y
Thompson, G W.... New-Brunswick, N J
Tillson, O J. ....Highland, N Y
Trowbridge, F... .... Milford, Ct
Underhill, E B........Poughkeepsie, N Y
Underhill. S W..... Croton Landing N Y
Wildey, D C............ ...Hudson, N Y
Williams, E & J C ....Montclair, N J
Wood, L L ....Vineland, N J
Worden, S................. Minetto, N Y

Seedsmen, Florists, &c.

Allen & Co., R H............. New-York
Balderston, George,........... Colora, Md
Barrett & Co., W E...... Providence, R I
Beach, S. .... Branford, Ct
Benson, Burpee & Co ... Philadelphia, Pa
Bliss & Sons, B K.............New-York
Bown, R R..........Brantford, Ont., Can
Brainard, D C.........Mt. Lebanon, N Y
Briggs & Bro.............Rochester, N Y
Brill, Francis,...... ......Mattituck, N Y
Brown & Sons, D H..New-Brunswick, N J
Brown, W F... ....Oxford, O
Buist, R ...Darby Road, Philadelphia, Pa
Buist, R., Jr......... ... Philadelphia, Pa
Carson, W H................ New-York
Clement, W................ Adrian, Mch
Crosman Bros............ Rochester, N Y
Detroit Seed Co....... .... Detroit, Mich
Dingee & Conard,........West Grove, Pa
Dreer, Henry A.. ....Philadelphia, Pa
Ferry, D M & Co.......... Detroit, Mich
Fleming, James,............. New-York
Goodsell, L W .... Amherst, Mass
Grieves, I ....Paterson, N J
Gregory, J J H........ Marblehead, Mass
Hance & Son, A..........Red Bank, N J
Hawkins & Cornish,..... .. Goshen, N Y
Hawley, R D............. Hartford, Ct
Henderson & Co., Peter,.......New-York
Hendrick, J .... Albany, N Y
Hexamer, F M..........New-Castle, N Y
Hovey & Co................Boston, Mass
Ives, John S.... .. .. Salem, Mass
Kern, Steber & Co.........St. Louis, Mo
Landreth & Son, David, Philadelphia, Pa
Lewis, R................. Castleton, N Y
Moon, O..................Morrisville, Pa
Moon & Son, Mahlon,.... Morrisville, Pa
Nelson & Co., D G......Fort Wayne, Ind
Nordyke, C A .. .. Richmond, Ind
Parsons & Co., R B ....Flushing, N Y
Petit, C...................... Salem, N J
Plant Seed Co..... ....St. Louis, Mo
Price & Knickerbocker,......Albany, N Y
Quinn, P T..... ....Newark, N J
Reeves, E A............. ... New-York
Rennie, W............Toronto, Ont., Can
Rice, J B ....Cambridge, N Y
Root, J A..... .... Skaneateles, N Y
Sanders, Carew, ...Colman, Mo
Sanders, Edgar,............... Chicago, Ill
Schlegel, Everett & Co...... Boston, Mass
Smith, Edw.,.......... .. ....Coila, N Y
Snook, L D..... ....Barrington, N Y
Spooner, W H............ Boston, Mass
Such, G...............South Amboy, N J
Teas, E Y.... .... Dunreith, Ind
Thorburn & Co., J M..........New-York
Tillinghast Brothers,........La Plume, Pa
Vick, James,.... ....Rochester, N Y
Washburn & Co. .... Boston, Mass
Watson, B M............ Plymouth, Mass
Wells, S M & D..... .. Wethersfield, Ct
Woolson & Co...............Passaic, N J

Cranberries.

Trowbridge, F............New-Haven, Ct

Seed Grains, &c.

Andre, J H..............Bingham's, N Y
Arnold, Charles,............... Paris, Can
Beattie, H C .. .. Bellona, N Y
Biddle, F C............. Chaddsford, Pa
Beekman, A S........ South Branch, N J
Blunt, A E.............. Cleveland, Tenn
Camp, J F.............. Apalachin, N Y
Casey, F................Harrisonville, O
Chase, E T........Deerfield Centre, N H
Crofut & Co., E B.........Syracuse, N Y
Crozier, W............... Northport, N Y

Cowles, C P.......... Syracuse, N Y
Doak, M S.................. Home, Tenn
Eastman, W L................ Ovid, N Y
Evans, R............ Hamilton, Ont., Can
Fanning, S B............ Jamesport, N Y
Heiges, J M .... York, Pa
Hendricks, H............ Kingston, N Y
Henry, E................. Greenville, Tenn
Hoffman, E L....... Mill Creek, West Va
Hotsenpiller, E............. Springfield, O
Hough & Co............. Knoxville, Tenn
Jerome, J H.......... Saganaw City, Mich
Jones & Co, H T......... Nashville, Tenn
Long & Co., N......... Russellville, Ky
Miller, J. .... Penn Yan, N Y
Packard, B G............... Medina, N Y
Perrine W D................ Lyons, N Y
Perry, W N.............. Rushville, N Y
Perry & Robinson,......... Syracuse, N Y
Phelps, C C .... Vernon, N Y
Roberts, D G............. Pittsfield, Mass
Scott, W.................... Geneva, N Y
Stacy, W W................ Geneva, N Y
Swan, R J.................. Geneva, N Y
Walker & Mairs,........ Schenectady, N Y
Whiting, C L................ Granville, O
Wilson, S.............. Mechanicsville, Pa
Wood, B L.................. Doe Run, Pa

Seed Potatoes.

Armitage, J H................ Tyre, N Y
Bliss & Sons, B K............. New-York
Brownell, E S......... Essex Junction, Vt
Campbell, G W.............. Delaware, O
Cowles, C P............... Syracuse, N Y
Gregory, J J H .... Marblehead, Mass
Green, W C........... Schenectady, N Y
Hexamer, F M........ New-Castle N Y
Holliday, S V....... North Springfield, Pa
Hulst, P D .... East Penfield N Y
Orbison, W A........... Huntingdon, Pa
Peters, C P.............. Concordville, Pa
Riehl, E A....................... Alton, Ill
Roberts, D G............. Pittsfield, Mass
Scott, W.................... Geneva, N Y
Stilson, G. .... Franklin, N Y
Talcott & Sons, J............. Rome, N Y
Tillinghast Bros.,......... Factoryville, Pa

Sweet Potatoes.

Brown & Sons, D H., New-Brunswick, N J
Oak Pond Farm....... Willimantic, Conn
Rathbone, W W............ Marietta, O

Implements, Machines, Fertilizers, &c.

Agricultural Warehouses.

Allen & Co., R H.....Box 376, New-York
Allen & Co., S L........ Philadelphia, Pa
Ames Plow Co...... Boston and New York
Bradley Manufacturing Co., Syracuse, N Y
Collins Company,.............. New-York
Cornell, O H P.............. Albany, N Y
Everett & Small,............ Boston, Mass
Griffing, H B.................. New-York
Higganum Manufact'g Co.,.. Higganum, Ct
Ithaca Agricultural Works,.... Ithaca, N Y
Lummus & Co., E E......... Boston, Mass
Nash & Brother,............... New-York
New-York Plow Co............ New-York
Price & Knickerbocker,...... Albany, N Y

Horse-Powers, Threshers and Other Machines.

Blymyer Company,........... Cincinnati, O
Ellis Keystone Ag'l Works, Pottstown, Pa
Gray & Sons, A W........ Middletown, Vt
Heebner & Sons,............ Lansdale, Pa
Harder, M............... Cobleskill, N Y
Westinghouse & Co., G., Schenectady, N Y
Wheeler and Melick Co ... Albany, N Y

Mowers and Reapers.

Adriance, Platt & Co........... New-York
Allen & Co., R H............. New-York
Bradley Manufacturing Co.. Syracuse, N Y
Eagle Mower & Reaper Co... Albany, N Y
Warrior Mower Co...... Little Falls, N Y
Wood, W A .... Hoosic Falls, N Y

Lawn Mowers.

Chadborn & Coldwell Manufacturing Co Newburgh, N Y
Graham, Emlen & Passmore, Philadel'a, Pa

Steam Engines for Farms.

Griffith & Wedge,........... Zanesville, O
Skinner & Wood,.................. Erie, Pp
Taylor Manufact'g Co., Westminster, Me
Whitman & Burrill,...... Little Falls, N Y
Wood, Taber & Morse,....... Eaton, N Y

Dairy Apparatus, &c.

Barker, J W., *Dairy Salt*,.. Syracuse, N Y
Blanchard's Sons, P., *Churn*, Concord, N H
Bunnell & Brown,.......... Guilford, N Y
Hardin, L S .... Louisville, Ky
Jones, Faulkner & Co.,........ Utica, N Y
Moseley & Stoddard,......... Poultney, Vt
Orange Co. Milk Pan Co.,.. Franklin, N Y
Reid A H., *Butter Worker*, Philadelphia, Pa
Vt. Farm Machine Co.... Bellows Falls, Vt
Weeks, G B................ Syracuse, N Y
Wells, Richardson & Co., *Color for Butter*, Burlington, Vt
Whitman & Burrill,...... Little Falls, N Y

Butter Packages.

Hubbell & Chesebro,........ Geddes, N Y
Koehler, J G. .... Philadelphia, Pa
Russell, D N.................. New-York

Pumps and Garden Engines.

Nason Manufacturing Co. .... New-York
Whitman, J A............ Providence, R I

Agricultural Steamers.

Barrows Savery Co. ..... Philadelphia, Pa
Burns, C S................. Cincinnati, O
McKenzie, W V........ Jersey City, N J
Prindle, D R...... East Bethany, N Y

Tile and Tile Machines.

Bender, W M............... Albany, N Y
Jackson, George,............ Albany, N Y

OTHER SPECIALTIES.

Allen, C G., *Horse Rake*,.... Barre, Mass
American Hay Machine Co.,*Hay Loader*, Troy, N Y
Barker & Son, *Road Wagons*, New-York
Bartholomew, C., *Ditcher*,.... Etna, N Y
Bliss & Sons, B. K., *Hand Seed Sower*. New-York
Boyer, W L., *Farm Mill*, Philadelphia, Pa.
Brown & Sharp M'f'g Co., *Horse Clippers*, Providence, R I
Butterworth, R., *Cider Mill*, Trenton, N J
Clark, Geo. R., *Fence*, Livonia Station, N Y
Corcoran, A J., *U. S. Windmill*, New-York
Crofut & Co., E B., *Iron Harrows, &c.*, Syracuse, N Y
Dederick & Co., *Hay Press*, Albany, N Y
Eclipse Windmill Co , *Windmills*, Beloit, Wis
Everett & Small, *Swivel Plows*, Boston, Mass
Fairbanks & Co.. *Scales*..... Albany, N Y
Fitch & Co., H W., *Hay Conveyor*, Lithgow, N Y
Gallup, S N.. *Grain Drill*, Macedon, N Y
Gawthrop & Son, A., *Hydraulic Rams*, Wilmington, Del
Gifford, Johnson & Co., *Cultivator*, Hudson, N Y
Goodell, D. H., *Sower*, ... Antrim, N H
Hickok, W. O., *Cider Mill*, Harrisburg, Pa
Holbrook Plow Co., *Plows*,.. Boston, Mass
Kenyon Bros., *Potato Digger*, Carbondale, Pa
Livingston & Co., *Corn Sheller*, Pittsburgh, Pa
Malleson, C H., *Corn Husker*, Hudson, N Y
Mayne, J., *Horse-Hoe*,.. Gilbertsville, N Y
Miller, L J., *Farm Mills*,.. . Cincinnati, O
Mohawk & Hudson Co., *Hay Press*, Waterford, N Y
Nash & Bro., *True's Potato Planter*, New-York
Nellis & Co., A J., *Harpoon Fork*, Pittsburgh, Pa
Newton, C O., *Spring Wagons*, Homer, N Y
Noyes, A., *Hand Weeder*,.... Bangor, Me
Oneonta Manufacturing Co., *Hodge Plow*, Oneonta, N Y
Pennock Manuf'g Co., *Hay Fork*, Kennett Square, Pa
Perry, F L., *Scarifier*, Canandaigua, N Y
Pope & Baldwin, *Corn Planter*, Quincy, Ill
Rue, G W., *Hand Cultivator*, Hamilton, O
Smoothing Harrow Works,... Geneva, N Y
Wagan, R M., *Green Corn Cutter*, Mt. Lebanon, N Y
Warrior Mower Co., *Randall Harrow*, Little Falls, N Y
Weeks & Co., G B., *Hay Fork*, Syracuse, N Y

FERTILIZERS.

Allen & Co., R H........ .... New-York
Baker & Co., H J............ New-York
Bowker, W H & Co.........Boston, Mass
Cayuga Plaster Co.,... Union Springs, N Y
Crocker, L L .... Buffalo, N Y
Excelsior Fertilizer Works,...... Salem, O
Farmers' Union,... L. I. City, Long Island
Griffing, H B... .... New-York
Henderson & Co., P..... .... New-York
Hobson, Hurtado & Co... ... New-York
Mapes, C V............... New-York
Pacific Guano Co.,.......... Boston, Mass
Quinnipiac Co....... .... Wallingford, Ct
Ralston & Kirke............. New-York
Rasin & Co., R W L....... Baltimore, Md
Rhodes & Co., B M........ Baltimore, Md
Waring & Bro., T.. .... Colora, Md
Wing & Evans,............... New-York
Wilcox, A. F., *Plaster*,.. Fayetteville, N Y

MISCELLANEOUS.

Alden Co., *Fruit Dryer*, 123 Chambers-St., New-York
Averill Chemical Paint Co., Cleveland and New-York
Collins & Co., *Berry Box*, Moorestown, N J
Corbett, A.. *Incubator*,........ New-York
Dana, C. H., *Sheep Labels*, West Lebanon, N H
Fisher & Norris, *Anvils*,.... Trenton, N J
Florence Sewing Machine Co., *Kerosene Stoves*, Florence, Mass
Gifford, W C., *Stanchions*, Jamestown, N Y
Giles, W W., *Well Auger*,.. St. Louis, Mo
Griffing, H B., *Earth Closets*,.. New-York
Gurley, W & L E., *Draining Levels*, Troy, N Y
Habirshaw, W. H., *Chemist*,... New-York
Haines, R H., *Berry Basket*, Malden, N Y
Hapgood & Co., C. E., *Wool*, Boston, Mass
Horne, W., *Teat Opener*, . Janesville, Wis
Hume, R., *Food for Cattle*, Richmond, Va
Hygroscope M'f'g Co., *Weather Indicators*, Albany, N Y
Kendall, E., *Barometers*, Lebanon Springs, N Y
Kidder & Laird, *Carbolic Preparations*, New-York
Lesley, A M., *Furnaces*, &c.... New-York
Lewis & Co., D W., *Dairy Products*, New-York
Mayne, J., *Water Wheel*, Butternuts, N Y
Masury & Son, J W., *Paints*,.. New-York
Merchant & Co., S L., *Portland Cement*, 76 South-St., New-York
Post, C C.. *Sap Buckets, &c* , Burlington, Vt
Ridgway & Russ, *Plumbers*, Albany, N Y
Rumsey & Co., *Cider Press Screws*, Seneca Falls, N Y
Stites & Co., *Iron Measures*, Cincinnati, O
Trowbridge, F., *Grafting Wax*, Milford, Ct
Trump Bros., *Scroll Saws*, Wilmington, Del
Tucker, Dr. W. G., *Chemist*, Albany, N Y
Wasson & Martin, *Roofing*, Albany, N Y
West Grove Manuf'g Co., *Peck's Atomizer*, West Grove, Pa
Wheeler, C L., *Foot Pad*,... Boston, Mass